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SUPPLEMENT

TO THE

HISTORY

OF

BRITISH FISHES.

BY

WILLIAM YARRELL, F.L.S. V.P.Z.S.

ILLUSTRATED WITH WOODCUTS.

IN TWO PARTS.

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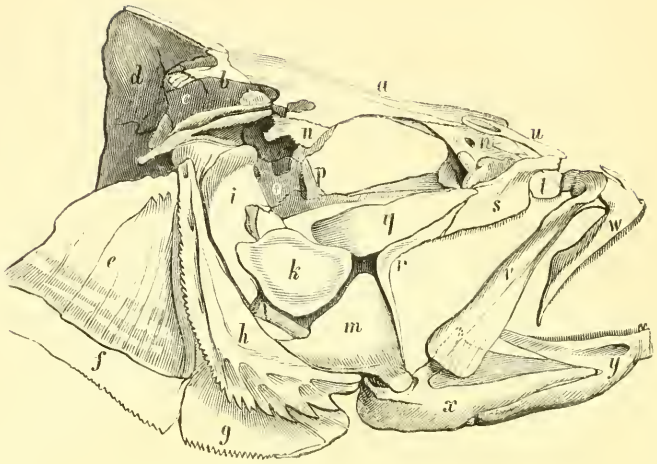
PREFACE TO THE SUPPLEMENT.

On publishing this Supplement to the History of British Fishes, I have only respectfully and very sincerely to return my best thanks to those friends and naturalists, who have, either by their private communications or public announcements, supplied the novelties contained herein.

These additions to the British Catalogue of Fishes are so many gratifying testimonials of the increasing number of observers, whose attention is directed towards the inhabitants of our seas; and I feel a sincere pleasure in the prospect of the many new subjects, and more correct illustrations, which our Ichthyology is likely to derive from the great interest now taken in this branch of Natural History.

To render the pictorial part of this Supplement as useful as its size and character would admit, I have introduced, as vignettes, representations of the bones of the cranium of several well-known fishes, derived from the works of Cuvier, Rosenthall, and others: and should this part of the plan be approved as a worthy mode of occupying a portion of that space usually devoted to lighter subjects, it may, on some future occasion be so enlarged upon as to include an illustration of one cranium in almost all the principal genera. In the present instance, however, not to interfere with the ornamental appearance of these crania, as vignettes, by a repetition of letters or numbers in reference to each particular bone, I have confined the markings to the Perch only, as here introduced, premising, that a little useful perseverance will lead to a knowledge of the analogous bones in other crania.



a. Principal frontal bone.
b. Parietal.
c. Inter occipital.
d. Inter parietal.
e. Operculum.
f. Suboperculum.
g. Interoperculum.
h. Preoperculum.
i. Temporal.
k. Tympanal.
l. Sympletic.
m. Jugal.
n. Posterior frontal.
n*. Anterior frontal.
o. Great ala.
p. Sphenoid.
q. Internal pterygoid.
r. Transverse.
s. Palatal bone.
t. Vomer.
u. Nasal.
v. Superior maxillary.
w. Inter maxillary.
x. Articular portion, and
y. Dental portion of the lower jaw, or inferior maxillary bone.

This Supplement is divided into two parts that each separate part may be bound up, if required, with the particular volume to which it more exclusively belongs. All the wood engravings in the Supplement have been executed by Mr. Vasey.

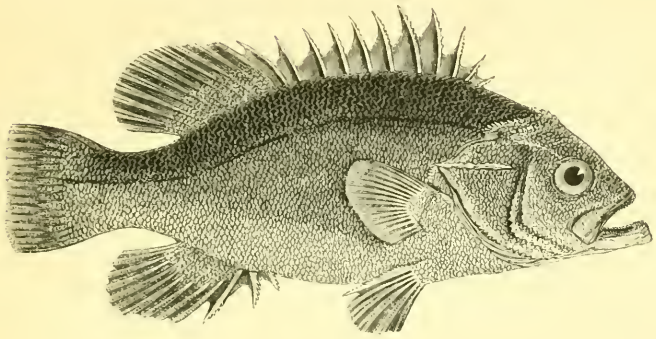
Ryder Street, March, 1839.

SUPPLEMENT

TO THE FIRST VOLUME OF THE

HISTORY OF BRITISH FISHES.

ACANTHOPTERYGII. *PERCIDÆ.*



COUCH'S POLYPRION.

Polyprion cernium.

Polyprion cernium,	Cuv. et Val. Hist. des Poiss. t. iii. p. 21, pl. 42.
,, ,,	M. A. Val. Mem du Mus. t. xi. p. 265, pl. 17.
Amphiprion Americanus,	Schneider, Syst. Ichth. p. 205.
,, *Australe,*	,, ,, pl. 47.
Scorpæna Massiliensis,	Risso, Ichth. p. 184.
	Stone Basse, Couch, Linn. Trans. vol. xiv. p. 81.
Serranus Couchii,	*Couch's Serranus,* Brit. Fish. vol. i. p. 12.

Generic Characters.—A single elongated dorsal fin, the rays of the anterior portion rather short and spinous, those of the secondary portion longer and flexible: branchiostegous rays 7; small incurved teeth on the bones of both jaws, on the palatine bones, and on the vomer, with some elongated teeth among the smaller ones; cheeks, operculum, the whole of the body, the base of the flexible portion of the dorsal and anal fin, and the base of the tail covered with small rigid scales, serrated at the free margin; suborbital bone, pre-

operculum and operculum, below the line of the pectoral fin, denticulated; operculum, above the line of the pectoral fin traversed by a single strong horizontal bony ridge, ending in a point directed backwards; over the eye, over the operculum, and over the origin of the pectoral fin, a semicircular row of short spines; the first ray of the ventral fin, and the first three rays of the anal fin, furnished also with small short spines.

In the first edition of the History of British Fishes, I ventured to consider the Stone Basse of Mr. Couch, of which that gentleman had favoured me with a drawing, as an undescribed species of the genus *Serranus* of Cuvier. At that time I had not seen a specimen of the fish. The Rev. R. T. Lowe, who has devoted great attention to fishes, particularly those taken at Madeira, where he has resided many years, first intimated to me that this, my supposed new Serranus,—which I had called Couch's Serranus, in reference to a naturalist and a friend, from whom I had received so much valuable assistance,—was in fact the *Polyprion cernium* of Cuv. and Val. *Hist des Poiss.* t. iii. p. 21, a species well known to him, being a common fish at Madeira, and which is now known to range as far to the south as the Cape of Good Hope. Since that time Mr. Lowe has sent me from Madeira a fine and perfect specimen of this fish, which I have shown to several good observers on our southern coast, where Mr. Couch's Stone Basse occurs, who have no doubt that this fish is the same as the Stone Basse of Mr. Couch, and it therefore now appears in its place among the British Fishes under its most recent systematic appellation. I am still, however, anxious to identify this species with the name of Mr. Couch, who first made it known as a British fish, and have therefore now called it Couch's Polyprion.

This species was the subject of a particular memoir by M. A. Valenciennes, published in the *Mem. du Mus.* t. xi. as already quoted, and is remarkable in having escaped the observation and record of all the early Schthyological writers, although the fish is common in the Mediterranean, attains a large size,—sometimes weighing one hundred pounds,—and

measuring five or six feet in length. Mr. Baker of Bridgewater tells me, that this fish, of three feet in length, is not uncommon in the Bristol Channel. Mr. Couch, in reference to its habits, says, "this species approaches the Cornish coast under peculiar circumstances. When a piece of timber, covered with barnacles, is brought by the currents from the more southern regions, which these fishes inhabit, considerable numbers of them sometimes accompany it. In the alacrity of their exertions, they pass over the wreck in pursuit of each other, and sometimes, for a short space, are left dry on the top, until a succeeding wave bears them off again. From the circumstance of their being usually found near floating wood covered with barnacles, it might be supposed that this shell-fish forms their food; but this does not appear to be the case, since, in many that were opened, nothing was found but small fishes. Perhaps these young fishes follow the floating wood for the sake of the insects that accompany it, and thus draw the Stone Basse after them."

The Rev. Robert Holdsworth of Brixham, who has furnished me with many interesting notes on British fishes, sends me word that on the Devonshire coast this fish is also called Stone Basse and Wreck-fish, thus illustrating the habits of the species as noticed by Mr. Couch, by a reference to the floating timbers to which the barnacles adhere, and float along with them. Two paragraphs from Mr. Holdsworth's letter on this fish, are as follows:—"October 7, 1824. The crew of the Providence smack found a large log of mahogany in Start Bay, covered with long barnacles, and surrounded by a shoal of these fish. They jigged,—that is, caught with a pole, having a barbed hook at the end, four or five. I had two cooked, which I purchased of the crew of the Providence, and found them excellent." Captain Nicholls, in a voyage from St. John's, Newfoundland, to the coast of Portugal, "having his ship's bottom very foul, and

covered with barnacles, was becalmed for many days within a hundred leagues of Oporto, and was for a fortnight surrounded with these fish, which followed the ship, and were caught by the crew. He fed his men upon them for twelve or fourteen days, and considered them excellent food."

As before noticed, according to M. Valenciennes, Savigny, and Risso, this Polyprion,—the only species of the genus,—is common in the Mediterranean, where it lives throughout the year over rocky bottoms in deep water. The flesh is white, tender, and of good flavour. M. Valenciennes says it feeds on mollusca and small fishes; he found sardines in the stomach.

The Rev. R. T. Lowe says this Polyprion is one of the most common fish in the market at Madeira; where, when small, it is called Chernotte, and when large, Cherne, (pronounced Shareny by the Portuguese,) and Jew-fish by the English. It is there, also, deservedly held in esteem for the table.

Specimens taken at the Cape of Good Hope were sent by M. Delaland to Baron Cuvier at Paris, who could perceive no difference between them and specimens from the Mediterranean or the Channel.

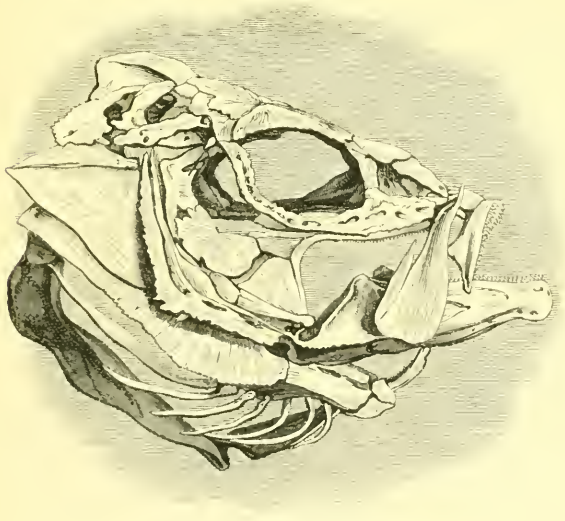
There is good reason to believe, on the authority of Dr. Latham, as recorded by Schneider, that this fish also inhabits the shores of America.

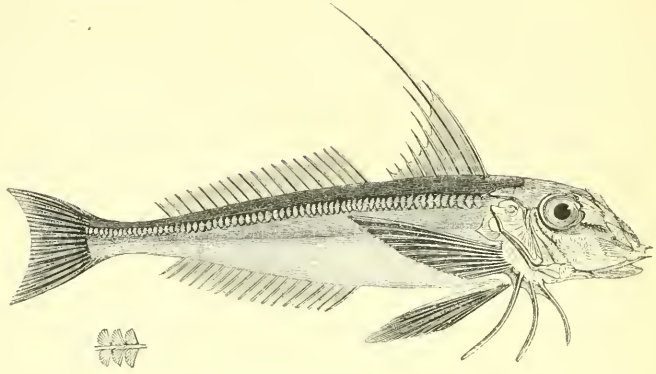
In the fish here described, the length from the point of the upper jaw to the posterior end of the horizontal bony ridge on the operculum, is to the whole length of the fish, exclusive of the caudal rays, as one to three; the depth of the fish in the vertical line of the origin of the ventral and pectoral fins, is to the whole length, from the point of the lower jaw, when the mouth is open, to the end of the caudal rays, also as one to three; the thickness of the fish equal to half its height; the lower jaw is the longest; the nostrils double, the openings circular; the eyes dark brown; the peculiarities

of the head, teeth, and gill-covers, are detailed in the generic characters; the ventral and pectoral fins have their origin in a vertical line under the fourth spinous ray of the dorsal fin: the upper half of this fish is of a dark purplish brown, the under part almost silvery white; the membranes connecting the various fin-rays dark brown; the extreme margin of the tail is nearly white. Young specimens are described and figured as marbled over with two shades of brown; the lateral line rises high over the base of the pectoral fin, afterwards following a course nearly parallel with the outline of the back. The figure here given was taken from the specimen of this fish sent me by Mr. Lowe, which measured sixteen inches in length. The fin-ray formula is as follows:—

D. 11 + 12 : P. 16 : V. 1 + 5 : A. 3 + 9 : C. 17 : Vert. 26.

A representation of the bones forming the cranium of this Polyprion is here added as a vignette.





THE SHINING GURNARD,

OR LONG-FINNED CAPTAIN.

Trigla lucerna.

Cuculus		Rondelet, Latin edition, p. 287.
Rouget,		,, French edition, p. 227.
Trigla lucerna,	*Brigotte,*	Brunnich, p. 76.*
,, ,,	*Orghe,*	Risso, Ichth. p. 209.
,, *milvus,*	,,	,, Hist. p. 395.
,, *lucerna,*	*L'Orgue,*	Cuv. et Val. Hist. des. Poiss. t. iv. p. 72.
,, ,,	*Long-finned Captain,*	Mag. Zool. and Bot. vol. i. p. 526.

The Gurnard figured above has been made known as a species new to the British Catalogue by Dr. Parnell, who obtained several specimens from the fishermen of Brixham in Devonshire, by whom, in reference to the elongation of the second ray of the first dorsal fin, it is called the Long-finned Captain, and by whom also it is not considered rare. The reason why a species so strongly marked as to specific dis-

* Ichthyologia Massiliensis, 1768.

tinction should have remained till lately unnoticed on our shores, will probably be found in the circumstance that this Gurnard does not generally exceed nine inches in length, which not being considered by the fishermen a marketable size, the fish is not often brought on shore; yet its flesh is esteemed as sweet and delicate.

The capture of several examples of this fish at Brixham, and the announcement of the circumstance in the first volume of the Magazine of Zoology and Botany, page 526, with a description and figure, has not, that I am aware, elicited any notice of its occurrence on other parts of our coast, yet it may be presumed to be plentiful as a species; Dr. Parnell saw seven taken at once in a trawl net, and it is decidedly common in most parts of the Mediterranean. Brunnich, who described it in 1768, as quoted under the representation of the fish, found it at Marseilles. Savigny, according to M. Cuvier and Valenciennes, found it at Naples. Dr. Leach sent specimens to Paris from Malta. M. Risso includes it in both his volumes among the fishes taken in the environs of Nice, and mentions it even as one known to Aldrovandus, quoting lib. ii. cap. 58, page 279. But little appears to be known of the particular habits or food of this species; but it is supposed to spawn about June, from the large size of the roe in a female fish taken in that month. Dr. Parnell's specimens were obtained in the month of September.

I have followed M. Cuvier and Valenciennes in including references to the work of Rondelet, but with some doubt whether the fish there represented and described is not rather a different species of Gurnard. Our fish was probably called *lucerna*, from the brilliant and shining longitudinal silvery band which pervades the whole length of each side. I am indebted to Dr. Parnell for the specimen from which the following description was taken.

The whole length nine inches and one quarter. From

the point of the nose to the end of the occipital spine, is to the whole length of the fish as one to four; the depth of the head is to the whole length of the fish as one to six and a half; the depth of the body is to the whole length as one to six; the nose is rather short and blunt; at the superior anterior edge of each orbit is a single short bony spine directed upwards; at the inferior anterior edge of each orbit there is a groove directed downwards and forwards to the base of the external nasal bone, in which groove, about half way between the eye and the nose, the nostril is pierced; the exterior surface of the head granulated and hard; the posterior margin on each side furnished with two spines directed backwards, one from the edge of the operculum, the other from the occipital bone above it; the region of the scapula, behind the operculum, is furnished with another spine, also directed backwards. The fin-ray formula is as follows:—

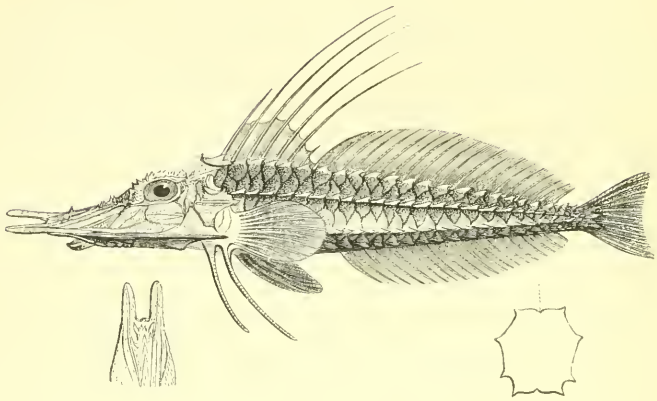
D. 9—18 : P. 10—3 : V. 6 : A. 17 : C. 14.

The first dorsal fin commences in a line over the base of the pectoral fin, the second ray is more than as long again as the first ray, and the third ray is also a little longer than the first ray; afterwards the rays decrease in length gradually, the last ray being the shortest; the second dorsal fin commences in a vertical line over the anal aperture; the rays of this fin are nearly uniform in length throughout, the fin ending on the same plane with the anal fin, the rays of which commencing immediately behind the anal aperture, are also nearly uniform in length throughout; the tail in shape is lunate; the dorsal ridge contains from twenty-four to twenty-six plates, each ending in a single point; the lateral row of scales, peculiar to the Gurnards, are in this species formed like wings, and are represented of an enlarged comparative size below the tail of the figure of the fish. The head and upper part of the body are of a fine vermilion colour; the

irides silvery ; along the side of the body a broad and shining silvery band ; the belly below reddish white ; the pectoral fins of a deep blue ; all the other fins rosy red.

The characters of this Gurnard are so well marked that it is not likely to be confounded with any other species.

The vignette below represents the cranium of the Sapphirine Gurnard.



THE MAILED GURNARD.

Peristedion Malarmat.

Malarmat,	Belon, p. 209.
Cornutus, sive Lyra altera,	Rondelet, Lat. Edit. p. 299.
Forchato, Malarmat,	,, Fr. ,, p. 237.
Lyra altera,	Willoughby, p. 283, tab. S. 3.
Trigla cataphracta, Malarmat,	Brunnich, p. 72.
Malarmat,	Duhamel, t. iii. Sect. 5, p. 113, pl. 9. f. 2.
Trigla cataphracta, Le Malarmat,	Bloch, pt. x. pl. 349.
Peristedion malarmat,	Cuv. et Val. Hist. Pois. t. iv. p. 101.
,, ,,	*Mailed Gurnard,* Mag. Nat. Hist. vol. i. N. S. p. 17.

Generic Characters.—Body covered with bony plates, forming a defensive armature. The nasal bone divided into two points. The mouth has no teeth. In other respects the characters are similar to those of the genus *Trigla*.

This singular-looking species, allied to the Gurnards, was made known as an addition to the catalogue of our British Fishes by Dr. Edward Moore of Plymouth, in the Magazine of Natural History for 1837, conducted by Mr. Charlesworth, as quoted among the references placed below the

figure: it was caught on the fishing ground between Plymouth and the Eddystone in the autumn of 1836. It will be observed by the synonymes quoted, which are arranged chronologically, that this fish has been known from the time of Belon, who published in 1553, and has given a figure from an engraving on wood, which is easily recognised. This fish is also figured and described in the work of Rondelet, who from a resemblance which it bears to *Trigla lyra*, the systematic name of our English Piper Gurnard, British Fishes, vol. i. p. 44, called this fish *Lyra altera*, and also *Forchato*, from its elongated and bifurcated nasal bones. Brunnich, after Rondelet, called it *cataphracta*, in reference to the armour-like scales with which the body is defended. The term *Malarmat* applied to a fish so well armed, at least defensively, could only have been bestowed in joke by way of antiphrase.

M. Risso, who has briefly described some of its habits, says, it frequents deep water over rocky ground, approaching the shallows only at the period of spawning. It swims with rapidity, occasionally breaking off portions of the extended nasal bones against the rocks among which it harbours. It is said to be solitary in its habits, and feeds upon such animals as the medusæ, the beroe, and the thinner skinned crustacea. This fish inhabits all the western parts of the Mediterranean, and is rather common on most of the shores, where it attains the length of two feet. The British specimen recorded by Dr. E. Moore was about eleven inches long. It is said to be a rare species in the Adriatic, but has been taken at Venice. Duhamel, in his *Traité des Peches*, says, that this fish, though so rare on the coasts of the Channel as to be almost unknown, is common on the coasts of Spain and Provence, where it is caught in deep water. It is fished for all the year; but as an article of food it is in the greatest estimation in Lent. As there is but little

to eat upon this fish when it is small, those of the largest size are the most in request. Duhamel gives the following instructions for preparing this fish for the table: if it is intended for stewing, it is necessary to soak it in warm water in order to get off the skin and scales, which is most easily effected by commencing the removal at the tail; if it is preferred to broil it, it is then only necessary to open the body of the fish, and put inside fresh butter, fine herbs, and seasoning to increase the flavour of the meat, which is white and delicate. When it is sufficiently cooked the scales come off easily.

Dr. Moore very obligingly sent his British specimen of this fish up to London that I might see it, and I found that it exactly resembled an example from the Mediterranean in my own collection, with which I compared it.

The bones of the nose are very much elongated, forming a projecting and forked snout of two broad and flattened processes, which are each an inch in length, and parallel to each other, half an inch apart at the base, on the upper surface of which there are one large and two smaller mammillary protuberances. From the end of the elongated nasal bone to the posterior end of the ridge on the cheek at the base of the pectoral fin, the length is three inches and a half in a fish of eleven inches, or rather less. The nasal, orbital, and occipital ridges, are armed with numerous sharp tooth-like processes. The orbit of the eye is oval, its greatest length horizontal, the irides silvery; the jaws are semicircular in shape; the form of the opening of the mouth, which is without teeth, is also semicircular; the length of the head, from the point of the nasal bone to the end of the suborbital ridge, is to the whole length of head, body, and tail together, as one to three.

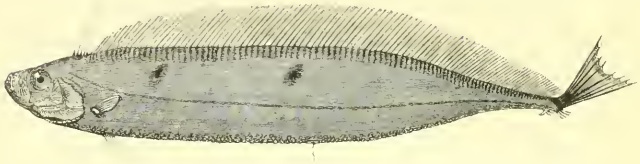
The body is octagonal, covered with bony scales, or plates, laid over each other like a coat of mail; from the centre of

the scales, forming in continuous lines the eight angles of the body, projects a sharp-pointed process directed backwards; the scales vary in number on the different angles from twenty-three to thirty.

The fin-ray formula, according to Cuvier, is as follows :—

D. 7. 19 : P. 12. 2 : V. 1 + 5 : A. 18 : C 11 : Vert. 43.

The first dorsal fin has seven rays, but the point of distinction between the first and second dorsal fins is liable to some misconception, as it is only indicated by a decrease in the extent or elevation of the connecting membrane. Five or six of the rays of the first dorsal fin end in elongated flexible filaments, as shown in the figure. It is supposed that the males only in this species have these filaments elongated, the rays in the females remaining short, and this may account for some differences that appear in the representations given by some of the authors herein referred to. The second dorsal fin usually contains eighteen or nineteen short rays. The pectoral fin is stated by Cuvier to contain twelve rays, but his figure in illustration exhibits but ten rays, and I find there are ten rays in the pectoral fin in the Mediterranean specimen before referred to; Dr. Moore's fish is described as possessing but eight rays; they appear therefore liable to variation; the free rays common to the Gurnards are in this species limited to two; between the ventral fins is an elongated and flattened sternum; the body ends at the tail in three short projecting spines on each side of the base of the caudal rays; the form of the tail is lunate. Dr. Moore says of his fish that "its colour, when fresh, was of a uniform scarlet, like the Red Gurnard, gradually softening to pale flesh colour towards the abdomen; the anal and dorsal fins were crimson; but the others pale and greyish.



THE VAAGMAER,

OR DEALFISH.

Trachypterus vogmarus.

Trachypterus, Bogmarus, Cuv. et Val. Hist. Nat. des l'oiss. t. x. p. 346.

The publication of the History of British Fishes has brought me into communication with Professor John Reinhardt, Curator of the Royal Museum, and also of the University Museum at Copenhagen. This gentleman, desirous of supplying the deficiency, both as to figure and description, which existed at the time of publishing the account of the Vaagmaer, or Dealfish, British Fishes, vol. i. p. 191, has very obligingly forwarded to me a copy of his memoir, printed in the Transactions of the Royal Society of Copenhagen, containing a detailed account and a figure of this fish, from a specimen obtained in Iceland. By the kindness of Dr. Cantor, the friend and countryman of M. Reinhardt, I am enabled to present a free translation of so much of this Danish paper as refers to the description of this very rare fish, with a reduced figure from the plate which accompanied the memoir.

The specimen of the Vaagmaer, from which the drawing and description were taken, was during the summer of 1828 thrown up alive on the beach near Thorshavn in Iceland, and was procured by Mr. Möller for the Royal Museum of Natural History. Fortunately, a ship at the time was ready to sail for Copenhagen, by which the fish, preserved in spirits, was forwarded. It arrived in about ten days, and in such beautiful condition that the brilliant red colour of the fins had not faded, nor had the membrane connecting the fin-rays been torn; only the anterior dorsal and the ventral fins were injured, so as to leave but short roots; the continuation of which is therefore indicated by fine lines.

A previous account of this, as well as of another less perfect specimen, found thrown on shore near Frederikshavn in Jutland, was laid before the Royal Society of Copenhagen in the winter of 1829. As I have not been able to procure a better specimen, and a useful delineation of this fish is wanted, while we, through the figures given by M. Valenciennes, are enabled to compare several species from the Mediterranean, I have thought it right to supply this deficiency by having an engraving made under my own superintendence of the Icelandic Vaagmaer, to the description of which the following paper is devoted.

The result of the account of the two specimens above mentioned, as communicated in 1829 to the Royal Society, was, that the Northern Vaagmaer, contrary to the opinion of its former describers, is indeed provided with ventral fins, by which its generic relation to those of the Mediterranean has been decided, as well as its systematic rank: while a comparison with one of the Mediterranean species preserved in the Museum, established its specific difference.

M. Valenciennes, in his excellent account of the genus *Trachypterus* in his tenth volume, has added a few remarks to the previous history. Although the specimen he examined

was dried and partly defective, the relative dimensions and the number of the dorsal rays nevertheless agree. Some difference between the short description of M. Valenciennes and that which follows, will be pointed out hereafter.

The body of the Vaagmaer is compressed, or sword-blade like throughout, more than half of its whole length, or, in the present specimen, from the occiput to within eleven inches of the caudal extremity of the dorsal column; the height is nearly the same at both extremities, and only one seventh part less than the height at the central part of the body, where it is greatest. In this particular it differs from the two species from the Mediterranean, with more than one hundred and sixty dorsal rays, according to their dimensions given by M. Valenciennes,—namely, those of *Trachypterus falx*, and *Tr. iris*, a difference distinctly shown, particularly in the latter species. In those two species the greatest height is at, or near, the occiput, from whence it more or less rapidly decreases towards the caudal fin. Of the *Tr. leiopterus* I am uncertain, as the author has given no dimensions of the height, although he elsewhere states that this species has a caudal fin much thinner than that of the *Vagmarus*.

The colour of the head and body is silvery, varied only by the blackish grey of the head, and by two obliquely oval spots of the same colour on each side. The long dorsal fin, and the almost vertical triangular caudal fin, are of a light red. The silvery colour arises from a thin layer on the epidermis, of the same nature as that of the ventral membrane observed in several other fishes. I have not been able to observe any traces of scales. The skin underneath the silvery cover is divided or furrowed by diagonal lines, forming small flat elevations, some of which are round, and others angular. Towards the abdominal margin, particularly on each side of the sharp edge, these elevations appear as papil-

lary warts of remarkable firmness, but by no means osseous, which, decreasing in size behind the anus, are lost entirely towards the tail.

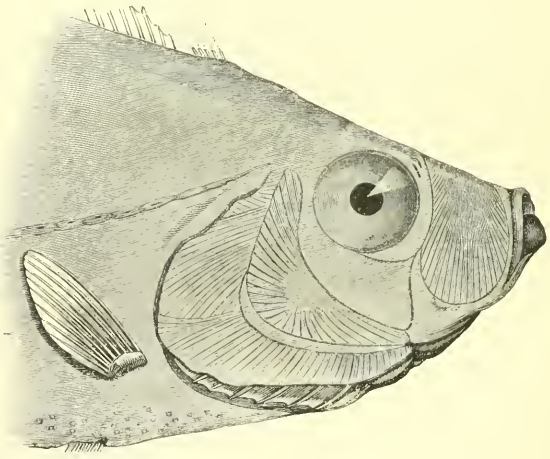
In the number of its lateral dark spots, the Vaagmaer resembles the *Tr. leiopterus*, which, according to M. Valenciennes, has only two ; but, in reference to the position of these spots, there exists a difference between these two species. In the Vaagmaer they are placed farther backwards, the situation of the most anterior spot being at the commencement of the second fourth part of the whole length of the fish, the posterior being situated about half way, or near the middle. Both spots are nearer each other in the *Tr. leiopterus* than in the present species. The total length of the specimen represented, measured from the point of the nose to the end of the dorsal column, is forty-three inches six lines ; with the upper jaw protruded the whole length is forty-four inches seven lines. The greatest height of the body in the present specimen, twenty inches from the angle of the mouth, or four inches in advance of the anus, is contained five times and a half in the length, while the height at the nuchal region, about six inches from the end of the nose, is contained nearly seven times in the total length. The height at a distance of thirty-six inches is but a little more than one eleventh of the total length, and at the distance of forty inches is little more than one thirtieth.

The greatest diameter is near the part where the gill-cover is attached to the head, and is contained four times in the height of that region, or five times in the greatest height, the diameter of which is scarcely one-tenth. The diameter decreases towards the narrow part of the tail. The greatest diameter of the body is in the region of the lateral line, and decreases towards the dorsal and ventral profile, particularly towards the former, where it becomes sharp like the edge of a knife, by which the spinal processes and the intervening

bones of the dorsal rays become apparent on the surface of the thin external covering.

The head from the end of the nose to the posterior margin of the gill-cover is contained seven times and a quarter in the total length; the length of the head is therefore nearly equal to the height of the fish at the nuchal region. The outline of the lower jaw forms an ascending arch, which at the angle of the mouth meets the straight and slightly declining profile of the forehead, by which the lower jaw, when the mouth is closed, becomes much elevated, and the opening of the mouth turned upwards. When the lower jaw sinks into a horizontal position, the upper jaw is much projected, and becomes somewhat longer than the lower.

The formation of the jaws, the form and position of the gill-covers, and the radiating grooves on the latter, on the jaws and frontal bones, agree with the description of those parts in the *Tr. Falx*, as given by M. Valenciennes, to which I beg to refer as far as regards the Vaagmaer.



The dentition in this species appears to exhibit some deviations from that of *Tr. Iris* and *Tr. Spinola*, in which the teeth of the upper and lower jaw are nearly vertical, and are seen, although the mouth is more than half closed. In the description of *Tr. Falx* no mention is made of the position of the teeth. In the Vaagmaer the maxillary teeth are thin, conical, and pointed, nearly recumbent, with the apex turned towards the pharynx. On the intermaxillary bones only four teeth appear, two on each bone, somewhat within the margin: the inner teeth do not exceed two lines in length. In the lower jaw the teeth are placed nearer the outer margin, and towards the front, four on one side, three on the other, with some variation in size. A single-pointed tooth, three lines in length, is placed vertically on the central line of the vomer, but no other sharp teeth appear either behind this tooth, or on the palatine bones, which, according to M. Valenciennes, is the case in *Tr. Falx*. The superior pharyngeal bones are studded with pointed curved teeth, one line in length; the inferior pharyngeal bones are wanting altogether.

The large eyes, lodged in a circular orbit, are situated near the frontal profile. The longitudinal diameter of the orbit is, compared to the length of the head, as one to three and a half; the iris is silvery white, its breadth somewhat greater than the diameter of the pupil.

The nostrils are very small, opening into narrow cavities, situated above the anterior and superior part of the orbital margin; the larger nostril, a small rima, is situated close upon the margin; the smaller one is oval, and is placed a little higher up.

The anterior extremity of the tongue is somewhat broad, with a rounded margin, concave above, flat and keeled underneath; the tongue is entirely free, and may easily be placed in a horizontal position, as if intended to throw small bodies towards the pharynx.

The lateral line, commencing from the nuchal region, descends nearly vertically opposite the middle of the orbit, from whence it proceeds obliquely downwards, until behind the pectoral fin, it reaches a distance from the ventral profile somewhat shorter than the distance of the dorsal profile. It now continues straight towards the extremity of the tail, approaching the lower caudal margin. This line is covered by a series of small oblong osseous shields, from the middle of which rises a small spine directed forwards. The shields and their spines increase in size towards the thin part of the tail, from whence they again decrease, although the last shield is much larger than those of the central part.

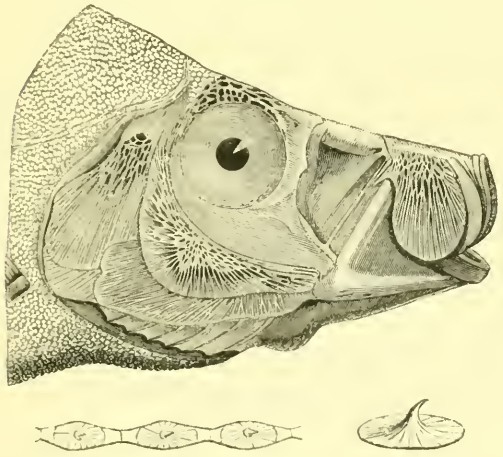
The short pectoral fins are situated nearer the ventral margin than to the lateral line, and nearly opposite the apex of the gill-cover. The number of the rays is in the right pectoral fin eleven, in the left only ten.

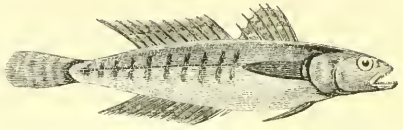
Of the ventral fins, there remain only some short roots of the rays, situated close to the ventral margin, in a direction nearly parallel with, but a little further back, than the pectoral fins. The number of the rays is six.

Of the rays of the anterior dorsal fin only five roots are left, the first of which is somewhat thicker than the rest, and situated five inches eight lines from the edge of the closed jaws. The interval between this fin and the commencement of the posterior dorsal fin, is twice the distance between two rays. The posterior, or long dorsal fin, has one hundred and seventy-two rays, of which the first ray is situated six inches and one line from the point of the jaw; the last ray half an inch from the last vertebra. The anterior part is very low, increasing in height by degrees, until it reaches the commencement of the last fourth part of the total length, where the height of the present specimen amounts to three inches eleven lines, or about one half of the greatest height of the body; from thence it decreases rapidly, so that the last ray

is only a little longer than the first. The rays are slender, flexible spines, without the slightest trace of transverse marks; their articulating surface dilates into a saddle-shaped shield, with a short curved point in the centre, by which a number of small sharp bodies appear along the root of the fin. The rays themselves, however, are quite smooth to the touch, and, under a lens, are, as M. Valenciennes in his own specimen found them, a little sharp.

The more or less vertically raised caudal fin contains eight rays; the length of the upper and under ray is to the length of the two central rays as four to three. The latter named rays are sharp to the touch, and viewed through a lens are observed to be studded over with a number of small spines.





THE SLENDER GOBY.

Gobius gracilis.

Gobius gracilis, *Slender Goby*, Jenyns, Man. Brit. Vert. p. 387.
,, ,, ,, ,, Parnell, Wern. Mem. vol. vii. p. 245.

This Goby, though described from Mr. Jenyns' work, was not figured in the former volumes of the British Fishes. It has probably been long confounded with *Gobius minutus*, but is more slender, and otherwise distinguished. It was first described by the Rev. Leonard Jenyns in his Manual of the British Vertebrate Animals, from specimens obtained on the coast of Essex. Dr. Parnell says, "This well-marked Goby is occasionally found in the Firth of Forth, but is not common; it inhabits the same situations as the *minutus*, and they are frequently taken together. I have found it in the Solway Firth, and in much greater plenty on the southern coast of England. It spawns in June, and is of little value except as food for other fishes and aquatic birds."

Mr. Jenyns' description is as follows:—

"Length, three inches two lines. Form closely resembling the *minutus*, but more elongated and slender throughout; greatest depth barely one-seventh of the whole length: snout rather longer: opercle approaching more to triangular, the

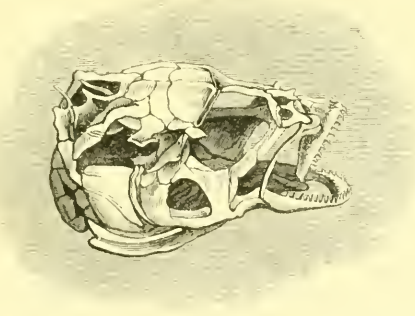
lower angle being more cut away, and the ascending margin more oblique; a larger space between it and the pectorals: the two dorsals further asunder: rays of the second dorsal longer; these rays also gradually *increasing* in length, instead of *decreasing*, the posterior ones being the longest in the fin, and rather more than equalling the whole depth: rays of the anal in like manner longer than in *G. minutus*.

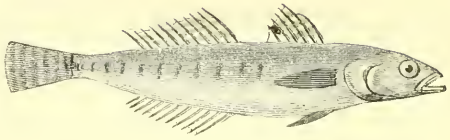
The fin-rays in number are—

D. 6. 12 : P. 21 : V. 12 : A. 12. : C. 13, and two short rays.

In all other respects similar. The colours also resembling those of *minutus*, with the exception of the anal and ventral fins, which are dusky, approaching to black in some places, instead of plain white, as in the *minutus*."

The vignette below represents the cranium of *Gobius niger*.





THE ONE-SPOTTED GOBY.

Gobius unipunctatus.

Gobius unipunctatus, One-spotted Goby, Parnell, Memoirs of the Wernerian Nat. Hist. Soc. vol. vii. p. 243.

This Goby, says Dr. Parnell, "does not appear to have been noticed by previous authors. I have observed it in most of the sandy bays in the Firth of Forth; but in greater numbers, and of larger size, in the neighbourhood of the salmon-nets above South Queensferry, where it may be found throughout the summer months in water from two to three feet deep. I found it on the south coast of England, equally common with the *Gobius minutus*, or Freckled Goby. I have also found it in many situations where the *minutus* was not seen; and the *minutus* has been taken in many places where the *unipunctatus* did not exist. The most northern locality in which it has yet been observed appears to be the Moray Firth, where James Wilson, Esq. obtained a fine specimen of three and a half inches in length."

"This fish, although closely allied to the other species of the same genus, is undoubtedly quite distinct from them; the black spot on the first dorsal fin being far more constant and

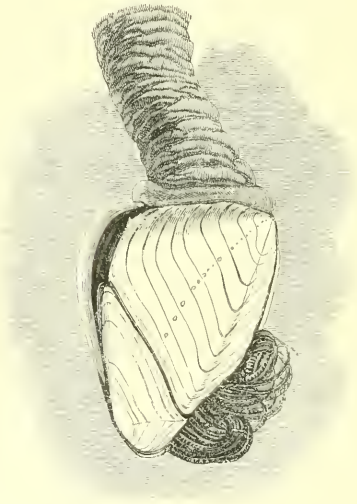
conspicuous than any character which distinguishes the rest of the British Gobies. The only species it can well be mistaken for is the *G. minutus*, but differs from it in having a black spot between the fifth and sixth ray of the first dorsal fin; the second dorsal with eleven rays, and the tail fin even at the extremity. Whereas the *G. minutus* has no black spot between the fifth and sixth ray of the first dorsal fin; the rays of the second dorsal ten in number, and the tail fin rounded at the end."

A specimen, two inches and a half in length, is thus described by Dr. Parnell. "Body rather elongated, rounded in front, compressed at the tail; flattened on the nape; head long in proportion to its depth, one fourth of the length, including half the caudal rays; operculum and preoperculum rounded. Colour of the head, back, and sides, pale brownish yellow; throat and belly white; dorsal and caudal fins freckled and barred with pale brown; first dorsal fin with a black spot between the two last rays, which assumes a beautiful appearance when newly taken from the water; lateral line crossed by six or seven dark spots, the one at the base of the tail being most conspicuous. First dorsal fin with fine flexible spiny rays, of which the second and third are rather the longest, commencing behind the base of the pectorals, and ending in a line over the end of the pectoral rays; second dorsal fin remote from the first, commencing in a line over the vent, and ending over the last ray of the anal; the anterior rays longer than the terminal ones; all flexible and branched, except the first, which is simple; anal fin similar to the second dorsal, leaving a wide space between its termination and the base of the caudal rays; ventral fins united so as to form but one fin; the middle rays the longest, extending to the vent; each ray is branched except the first and last, which are very short and simple; between each is stretched a membrane, forming the base of the ventral disk.

Pectorals, when turned forward, reaching to the middle of the orbit; the middle rays the longest; tail even at the end. Eyes rather large, placed high on the head, approximating; cheeks tumid; under jaw the longest; teeth small and sharp, placed in two rows in each jaw, none on the tongue, palatine bones, or vomer; a small tubercle in front of the anal fin. Number of fin-rays:—

D. 6. 11 : P. 16 : V. 10 : A. 11 : C. 15.

The vignette below is a representation of the barnacle.



THE WHITE GOBY.

Gobius albus.

Gobius albus, *The White Goby*, Parnell, Transactions of the Royal Society of Edinburgh, vol. xiv.

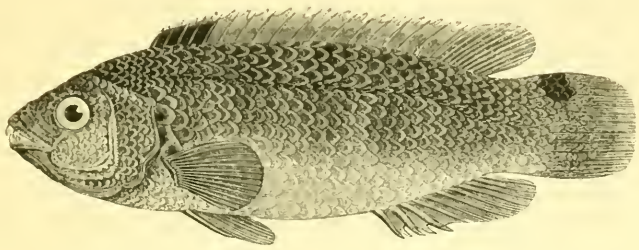
This species of Goby, Dr. Parnell observes, "holds such a conspicuous place in the genus, that it cannot well be mistaken for any other. I first noticed it in the Solway Frith, in June 1836, where I obtained in one day, after the recess of the tide, fifty specimens. They are evidently the fry of a large species. When first taken from the water they are soft and transparent; the eyes are large and prominent; the scales which cover their body are large, thin, and very deciduous. The length is about two inches; the head is large; the gape is wide; the teeth are long and sharp, placed in a single row in each jaw. The first dorsal fin commences over the anterior third of the pectorals; the second dorsal fin commences over the vent, and ends opposite to the base of the last anal rays. The cheeks are tumid; the border of the operculum rounded; the body is transparent, and marked by a number of fine depressed lines, placed in an oblique direction; the lateral line is straight throughout its length. The number of the fin-rays are—

D. 5. 13 : P. 16 : V. 13 : A. 13 : C. 12.

The last ray of the anal and second dorsal fin is longer than the first, and reaches, when folded down, to the base of the tail rays. These fishes are supposed (erroneously) by the fishermen to be the young of the Sting-fish, *Trachinus vipera*, and are consequently destroyed whenever they come within their reach. On transferring them to a bottle of alcohol they lose their transparent aspect, and become hard and opaque. In the month of July, when I had occasion to revisit the Solway Frith, I endeavoured to obtain additional specimens, presuming that by this time they would have somewhat increased in size; but not a single specimen could be found, nor has the parent fish ever come within the observation of the fishermen.

"The first dorsal fin of this fish, as possessing but five rays, is sufficient to distinguish it from every other British species of the same genus."

The teeth in this species are also more formidable in proportion to the size of the fish than those of any other British Goby.



JAGO'S GOLDSINNY.

Crenilabrus rupestris.

		Jago's Goldsinny,	Ray, Syn. Pisc. p. 163, tab. 1, f. 3.
Sciæna	*rupestris,*		Mus. Adol. Fr. pl. 31, f. 65.
Labrus	,,		Linn. Syst. Nat. p. 478, sp. 27.
,,	,,		Muller, Prod. Zool. Dan. p. 45, sp. 382.
Perca	,,		Muller, Zool. Dan. tab. 107.
Lutjanus	,,		Bloch, pt. vii. tab. 250, f. 1.
Labrus	,,		Nils. Prod. Icht. Scand. p. 76, sp. 5.
Perca	,,		Retz. Faun. Suec. p. 337, sp. 73.
Crenilabrus	,,	*Jago's Goldsinny,*	Selby, Mag. Zool. and Bot. vol. i. p. 167.
,,	,,	,, ,,	Thompson, Mag. Zool. and Bot. vol. ii. p. 445.
,,	,,	,, ,,	Thompson, Zool. Proc. 1837, p. 57.
Labrus	,,		Fries and Ekström, Scandinavian Fishes, pt. ii. pl. 3, fig. 1.

In the month of February 1836, Dr. George Johnston obtained three specimens of the *Lutjanus rupestris* of Bloch, two of which were picked up in Berwick Bay, and the third near Barncleugh ; these specimens were thrown on shore after

a violent storm, and having been sent by Dr. Johnston to his friend Mr. Selby, became the subject of a notice in the first volume of the Magazine of Zoology and Botany, as quoted under the figure of the fish here given.

This fish Mr. Selby most correctly referred to the Goldsinny of Jago, in the Synopsis of our countryman and naturalist John Ray, who appears to have been the first to make it known; but this fish being also a northern species, was afterwards figured and described in the various works here quoted among the synonymes. Since the occurrence of the specimens on our eastern coast, Mr. Thompson of Belfast has obtained two others at Bangor, County of Down, where they were caught, with one or two other species of Wrasse, by angling boys. I have received from T. S. Rudd, Esq. two beautifully coloured examples of this fish, which were taken on the Yorkshire coast, from the finest of which the figure here engraved was drawn; one specimen has also been taken on the coast of North Wales by my friend Mr. Thomas Eyton. Among some *Labri* supplied me by Mr. Couch from Cornwall, before the occurrence of the specimens in Berwick Bay, was a small fish of this species, but being by accident somewhat discoloured and distorted, and this species differing in colour when young, I did not recognize it as the *Lutjanus rupestris* of Bloch, but figured it as a vignette to the Scale-rayed of the British Fishes, vol. i. p. 300. Since that time Mr. Couch has very kindly supplied me with more small specimens, which will enable me to describe this fish as it appears at different stages of its growth, premising, however, that I have seen no examples of more than seven inches in length.

This species is taken occasionally in the Baltic; in Sweden, Denmark, and Norway, where it is sometimes caught by angling from rocks, as in this country. Another coloured figure of this fish has recently appeared in the new work of

MM. Fries and Ekström, on the Fishes of Scandinavia, now in course of publication, in parts, at Stockholm.

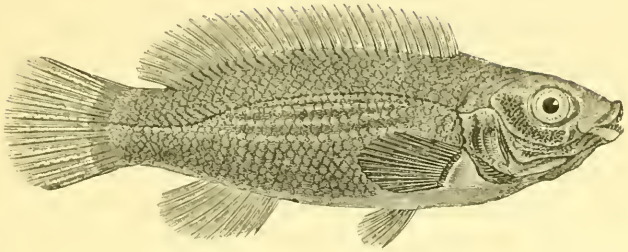
The length of the specimen here described was six inches and a half. The length of the head one inch and three quarters; the diameter of the eye three eighths and a half, or one fourth of the length of the head; the irides silvery; the teeth, long, strong, curved, and pointed, particularly in the anterior part of the upper jaw; both preopereulum and operculum covered with scales; the preopereulum distinctly crenated throughout the greater part of its ascending edge; the dorsal and pectoral fin commence on the same vertical line; the membrane connecting the first four spinous dorsal rays black; the spinous rays shortest at the commencement of the fin, becoming gradually, but slightly, more elongated towards their union with the soft rays, and in length about equal to one fourth of the depth of the body of the fish; the soft rays more lengthened; from the base of the last of which to the end of the caudal rays, is about the same length as that of the head, and about one fourth of the whole length of the fish. Half way between the base of the last soft dorsal ray and the extreme end of the caudal rays, there is on the upper edge of the body and tail a conspicuous roundish black spot, equally visible on either side; the caudal fin-rays scaled from their base on a line with this black spot half way along, the ends of the caudal rays slightly rounded; the anal fin with three spiny rays, and ending with elongated soft rays, the base of the last of which is a little in advance of the base of the last soft dorsal ray in a vertical line; the ventral fin begins a little behind and below the base of the pectoral fin; the pectoral is in length, compared to the length of the fish, as one to seven. The prevailing colour in the largest specimen is orange, the free edge of each scale being of a light golden yellow; the colour is darkest over the three or four lines of scales along the highest part of the back, and

lightest on the lower part of the sides and belly; the body is also indistinctly marked with five transverse bands, the first of which descends from below the more anterior spinous rays of the dorsal fin, and the fifth from below the elongated soft rays of the dorsal fin; but I have never seen these bands near so strongly marked as they are made to appear in Bloch's coloured figure, the ground colour of the body of which resembles that of one of my specimens. Young examples of this species are of a uniform yellowish flesh colour; the fins still lighter; but the black spot at the commencement of the dorsal fin, and on the upper part of the base of the tail, are very conspicuous from the uniform paleness of the body and fins generally, and, but for these two constant spots, are not unlike the *Labrus pusillus* of Mr. Jenyns, as figured in this Supplement. These spots appear to be good distinctions; very young specimens of *Crenilabrus cornubicus*, which in the British Fishes should have been called the Corkwing, are constantly marked with the spot on the middle of the side of the tail, in specimens measuring only one inch and a half in length. The fin-ray formula in Jago's Goldsinny is—

D. 17 + 9: P. 14 : V. 1 + 5 : A. 3 + 7 : C. 13.

The number of scales along the lateral line is thirty-two, and four or five more extend along the basal half of the rays of the caudal fin; there are four rows of scales between the lateral line and the dorsal ridge, and eleven rows of scales between the lateral line and the anal aperture.

M. Nilsson says, this species is liable to variations in colour, and some of the species taken in Northern localities are tinged with green.



THE CORKLING.

Crenilabrus pusillus.

Turdus minor, *Corkling*, Ray, Syn. Pisc. p. 165.
Labrus pusillus, ,, Jenyns, Brit. Vert. p. 392, sp. 70.
Crenilabrus multidentatus, *Ball's Wrasse*, Thompson, Proc. Zool. Soc. 1837, p. 56.

This species, of which no examples more than four inches in length have been as yet recorded, was obtained by Professor Henslow at Weymouth, and four or five specimens are now preserved in the Museum of the Cambridge Philosophical Society. I possess one which was sent me by Mr. Couch from Cornwall; and Mr. Thompson of Belfast has recorded the occurrence of three others, which were taken at Youghal in Ireland, by Mr. Ball, in the summer of 1835.

These last specimens were characterised by Mr. Thompson in the Proceedings of the Zoological Society for 1837, page 56—not without some hesitation—as a new species, under the name of *Crenilabrus multidentatus*; but subsequent comparative examinations of the specimens of the two countries, appear to show that they are identical, and they are here therefore brought together.

Mr. Jenyns' description of a specimen, four inches in length, is as follows:—"Distinguished by its small size. Back but little elevated, sloping very gradually towards the snout; ventral line more convex than the dorsal; sides compressed: depth contained about three times and three quarters in the entire length; thickness half the depth, or barely so much; head one-fourth of the entire length: snout rather sharp; jaws equal: teeth of moderate size, conical, regular, about sixteen or eighteen in each jaw: eyes rather high in the cheeks, situate half-way between the upper angle of the preopercle and the margin of the first upper lip; the space between about equal to their diameter, marked with a depression; a row of elevated pores above each orbit: preopercle with the ascending margin very oblique; the basal angle, which falls a little anterior to a vertical line from the posterior part of the orbit, very obtuse, and remarkably characterised by a few minute denticulations, which further on become obsolete, and in some specimens are scarcely anywhere obvious: lateral line a little below one-fourth of the depth; nearly straight till opposite the end of the dorsal, then bending rather suddenly downwards, and again passing off straight to the caudal; number of scales on the lateral line about forty-five: dorsal commencing at one-third of the length, excluding caudal; spinous portion nearly three-fourths of the whole fin, the spines very slightly increasing in length from the first to the last, which last is not quite one-third of the depth of the body; soft portion a little higher than the spinous, of a somewhat rounded form, the middle rays equalling nearly half the depth: anal commencing a little anterior to the soft portion of the dorsal, and terminating a little before it; the first three rays spinous, the third being the longest, but the second the stoutest spine; soft rays resembling those of the dorsal: caudal nearly even, with rows of scales between the rays for nearly half their length: pectorals rounded,

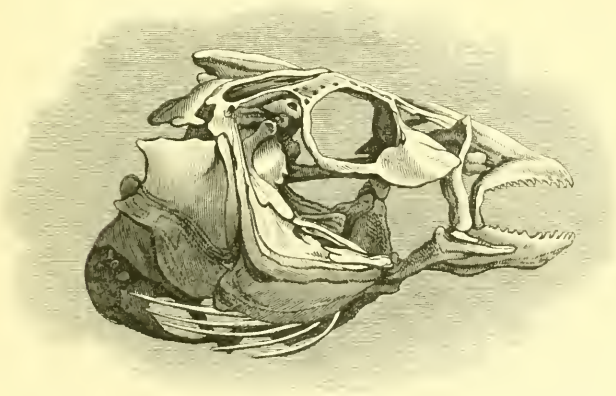
about two-thirds the length of the head, immediately beneath the commencement of the dorsal; all the rays soft and articulated, and, except the first, branched: ventrals a little shorter; the first ray spinous, shorter than the second and third, which are longest; all the soft rays branched; the last ray united to the abdomen by a membrane for half its length.

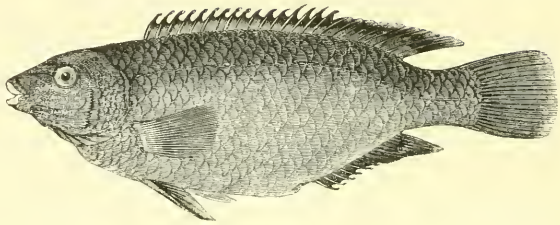
B. 5 : D. 20 + 10 or 11 : P. 14 : V. 1 + 5 : A. 3 + 9. : C. 13.

Colours of specimens in spirits yellowish brown, with irregular transverse bands; dorsal irregularly spotted with fuscous; anal light brown; the other fins pale."

"It is apparently," says Mr. Jenyns, "quite distinct from any of those described by other authors. Though belonging to the present section (*Labrus*), which it is convenient to retain, it would seem to form the transition to the *Crenilabri*, to which its near affinity is indicated by the rudimentary denticulations on the margin of the preopercle."

The vignette below represents the bones of the head in the genus Labrus.





THE SMALL-MOUTHED WRASSE.

OR ROCK COOK.

Crenilabrus exoletus.

Labrus exoletus,					Linn. Syst. Nat. p. 479, sp. 33.
,,	,,				,, Faun. Suec. p. 117, sp. 331
,,	,,				Muller, Prod. Zool. Dan. p. 46, sp. 386.
,,	,,				Fab. Faun. Gicenl. p. 166, sp. 120.
,,	,,				Retz, Faun. Suec. p. 335, sp. 67.
,,	,,				Nils. Prod. Icht. Scand. p. 77, sp. 7.
,,	,,				Fries et Ekst. Scand. Fish. pt. ii. pl. 3, fig. 2.
Crenilabrus microstoma,		*Small-mouthed Wrasse*,			Thompson, Zool. Proc. 1837. p. 55.
,,	,,	,,	,,	,,	Mag. Zool. & Bot. vol. ii. p. 446, pl. 14.
,,	,,	*Rock Cook*,			Couch, Cornish Fauna, p. 39.

Soon after the publication of the British Fishes, Mr. Couch very kindly supplied me with two examples of this Small-mouthed Wrasse, a species which I had not till then seen, and which on the Cornish coast is called the Rock Cook, where it is not so common as the Corkwing (*Crenilabrus Cornubicus*), nor does it take a bait like that fish, but is generally caught in the pots set for crabs. Since that time Mr. Thompson has recorded the occurrence of this species in two northern localities in Ireland, at Cairnlough in

the county of Antrim, and at Lough Foyle in the county of Londonderry. At the former place the fish was found by Dr. Drummond, and at both places by Captain Portlock.

Although this fish was most appropriately called *microstoma*, for it may be immediately distinguished when among other *Crenilabri* by this very obvious peculiarity, it proves to be a species long known to more northern naturalists. Mr. Thompson has given a coloured representation of this fish in the second volume of the Magazine of Zoology and Botany, as previously quoted, and the recent publication at Stockholm of another coloured figure in the second part of the Fishes of Scandinavia, by MM. Fries and Ekström, leave no doubt of the two fishes being the same, and enable us to identify our species as the *Labrus exoletus* of Linnæus. It is a fish of small size, seldom exceeding four inches or four inches and a half in length, and is taken occasionally on the coasts of Sweden, Denmark, and Norway, and, according to Fabricius, as far north as Greenland, where, however, it is said to be rare.

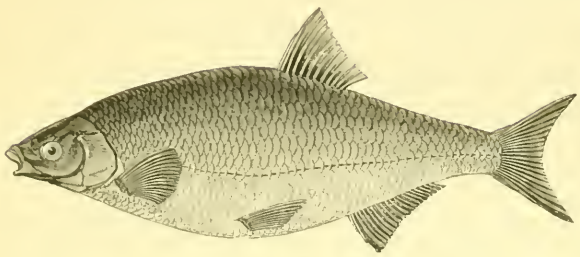
The specimen from which the figure and description were taken, measured four inches in length, and one inch and one quarter in depth; the length of the head compared to that of the whole fish, is as one to four, or rather less. This species exhibits a slight elevation over the eye in the line of the frontal profile; the figure here given marks the true position and relative length of the various fins. The teeth are flat, even, and incisor-like, with the corners slightly rounded; some light-coloured lines extend from the mouth to the orbit, and over part of the cheek; the irides are silvery; the colour of the head and body is dark brown on the upper part, passing into pale wood-brown underneath, and on the sides and belly; the colour of the dorsal, caudal, and anal fins dark brown; the pectoral and ventral fins lighter; and my specimens having been many months preserved in spirits

have lost some of the lighter tints which the coloured figure of Mr. Thompson's fish, and that also of MM. Fries and Ekström exhibit. The formula of the fin-rays is—

D. 19 + 6 : P. 13 : V. 1 + 5 : A. 6 + 7 : C. 12, and 2 shorter rays.

The number of Scales forming the lateral line are thirty-two, with four rows above to the dorsal edge, and eleven below to the anal aperture.

The vignette represents a mode of fishing practised in South America.



THE POMERANIAN BREAM.

Abramis Buggenhagii.

Cyprinus Buggenhagii,	*Carpe de Buggenhagen,*	Bloch, vol. iii. pl. 95.	
Abramis, „	*Large Scaled Bream,*	Thompson, Zool. Proc. 1837, p. 56.	

I am indebted to Mr. William Brandon of Chancery Lane for a fine specimen of this fish which was sent me in the year 1836 from Dagenham in Essex. Mr. Brandon who is the renter of the waters at Dagenham Breach, so well known to the London anglers, and who has frequently favoured me with examples of other species from this locality, having taken this Bream in his net with other fish, very kindly sent it to me with a note stating that it differed from the Bream he had usually caught in that water; and finding when he reached home and made closer examination, that it did not accord with the characters of either of the Bream figured and described in the British Fishes, he begged my acceptance of it, hoped it might prove of some interest, and requested to know what it was. I understand from Mr. Brandon that he has since at different times taken from twenty to thirty of the same sort.

The characters of this species are so decided, that I had no difficulty in identifying it as the *Cyprinus Buggenhagii* of Bloch; and on the next visit to London of my friend William Thompson, Esq. of Belfast, who has devoted such unwearied attention to the Zoology of Ireland, I found that he had also obtained an example of the same species of Bream from the river Lagan, near Belfast, which circumstance was made public in the printed Proceedings of the Zoological Society for 1837, page 56, as already quoted.

This species of Bream is at once distinguished from either of the two species which have been hitherto found in this country, by the greater thickness of its body, which is equal to half its depth; while in either of our other Bream the thickness of the body is only equal to one third of its depth; the scales of this species are also larger in proportion, although the figure here given, not having been drawn on a comparative scale with them, does not exhibit this peculiarity. The anal fin is shorter and has a smaller number of rays than that of *Abramis blicca*, which in its turn has its anal fin smaller, and with fewer rays than that of *Abramis vulgaris*, which is the Bream most generally known in this country.

This new species was first described by Bloch from specimens found in Swedish Pomerania, in the river Péne, and in the lakes communicating with it. The specimens were sent to Bloch by M. Buggenhagen, and hence the trivial name which has been devoted to it for specific distinction. I have also called it the Pomeranian Bream, considering it no objection to attach to this fish the name of the country in which it was first discovered, although it may happen to have been afterwards found elsewhere. The fish attains to the length of twelve or fourteen inches in that country according to Bloch; the flesh is white, but not much in request on account of the number of small bones which are found in it. It is taken in the same manner and by the same means as the common

Bream; and Bloch reports that the fishermen are greatly pleased when they take this fish in their nets: they have learned by experience that when this Bream appears they shall have a successful fishery: they believe that the other Bream follow this fish, and the name they have accordingly bestowed upon it in that country signifies guide or conductor. Except in Bloch I do not find this species included in either of the works I possess, or have yet gained access to, which treat of the fresh-water fishes of the different countries of the continent of Europe.

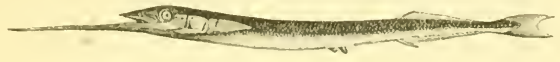
The specimen of this fish from Dagenham, from which the following description was taken, measured fifteen inches in length, of which the head was three inches, or, compared to the whole length of the fish, as one to five; the depth of the body a little in advance of the line of the first ray of the dorsal fin, where the body is deepest, five inches, or one third of the whole length; the thickness of the body two inches and a half, equal to half the depth, or one sixth of the whole length; the head is rather small and pointed, the mouth is also small; the diameter of the eye about one fifth of the length of the head, the iris silvery and about the same breadth as the pupil; the operculum rather large and angular; the pectoral fin rather small; half the ventral fin, in advance of a vertical line falling from the origin of the first dorsal fin ray; the dorsal fin commences exactly half way between the point of the nose and the end of the caudal fin; but the base of the dorsal fin in this fish is longer than the base of the same fin in either of our other species of Bream; the anal fin is shorter than that of the shortest of the other Bream, and has three rays less; it is also less falcate in form, or more equal in the length of its rays; the tail in shape at its posterior edge rather lunate, the outer rays elongated; the formula of the fin rays is

D. 12: P. 17: V. 9: A. 19: C. 19: Vertebræ 41.

The number of punctured scales forming the lateral line fifty-two; from the anterior edge of the dorsal fin to the lateral line, following the oblique direction of the scales, there are eleven scales; from the lateral line downwards to the base of the pectoral fin, four scales, not including in either enumeration the punctured scale of the lateral line itself.

Upper part of head and back dark blackish blue, becoming lighter on the upper part of the sides, and passing into silvery white on the lower part of the sides and belly; pectoral fin, dorsal fin and tail, bluish brown, tinged with pale red; ventral and anal fins with less brown and more pale red.

The vignette represents the bones of the head in the common Bream.



EUROPEAN HEMIRAMPHUS.

Hemiramphus Europæus.

Hemiramphus Europæus, European Hemiramphus, Mag. Nat. Hist. 1837, p. 505.

In a valuable communication on the Fishes of Cornwall, made to the Linnean Society some years ago by Jonathan Couch, Esq. of Polperro, which was published in the fourteenth volume of the Transactions of that Society, the author thus expresses himself in reference to a small fish which appeared to be a species of the genus *Hemiramphus*:—"I have met with a species which I have never seen described, unless it be the *Esox Brasiliensis Linn. Syst. Nat.* (Hemiramphus Brasiliensis Cuv.) It was taken by me in the harbour at Polperro, in July 1818, as it was swimming with agility near the surface of the water. It was about an inch in length, the head somewhat flattened at the top, the upper jaw short and pointed, the inferior jaw much protruded, being at least as long as from the extremity of the upper jaw to the back part of the gill-covers. The mouth opened obliquely downwards; but that part of the under jaw which protruded beyond the extremity of the upper, passed straight forward in a right line with the top of the head. The body was compressed, lengthened, and resembled that of the Garpike, *Esox belone*. It had one dorsal and one anal fin, placed far behind and opposite to each other. The tail was straight; the colour of the back was a bluish green, with a few spots; the belly silvery."

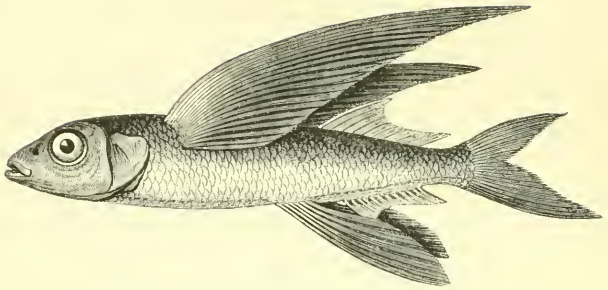
In August 1837, Dr. Clarke of Ipswich favoured me with a letter, of which the following is an extract:—"My brother, Mr. Edward Clarke of Ipswich, who is particularly interested in the study of British fishes, was examining the sea-shore in the vicinity of Felixtow, a village in Suffolk, between Harwich and Orford, a few days ago, August 7th 1837, when he observed a shoal consisting of myriads of small fish, which, upon a nearer examination, he supposed to be the young of the Garfish. As he had previously not found any so small, he secured a few specimens; and, upon bringing them home and examining them, they were found not to be the young of the Garfish, but those of a species of *Hemiramphus*. From their being so very young, it probably may be difficult to determine whether they belong to a described species; but from the circumstance of their having been seen in great abundance in a small pool left by the retiring tide, it is, I think, pretty evident that the ova must have been deposited and vivified in the neighbourhood of our shores. I send you the fish, thinking that an examination of the specimens themselves will be far more satisfactory than any figures or description of my own. One specimen was taken about double the size of those now sent to you."

The representation of this fish is half as large again as the natural size. It can scarcely be doubted from the quantity of fry seen, as well as from their very small size, that the spawn from which they were produced must have been deposited on our shores by the parent fish; and yet, as far as we are aware, these parent fish have hitherto escaped capture. This might not appear very extraordinary; but from the circumstance that the size attained by the fry in the months of July and August, as well as the general similarity in the form and appearance of the *Hemiramphus* to our well-known Garfish and Saury-pike, would lead to the belief that the *Hemiramphus* visited our shores about the same

time of the year as these fishes. The Garfish appears on the coast in April, and spawns in May; the Saury-pike makes its first appearance in June. For these fish, but particularly for the former, nets are worked on various parts of the coast, and considerable quantities are taken; but no adult specimens of *Hemiramphus*, unless we are to suppose they have remained hitherto unrecognised by the fishermen. It is also not a little singular, that up to the present time, with the exception of the small specimens already referred to, as taken at two places very distant from each other, no example of any species of Hemiramphus has been found, either in the Mediterranean, the Channel, or in the North seas. I have lately had an opportunity of conversing with two eminent foreign naturalists, to whom I showed the specimens, who agreed with me that no adult species of *Hemiramphus* had been recorded as found in the seas of Europe.

One question may be hazarded,—Is this fish, with its unequally developed jaws, the very young state of our common Garfish (*Belone vulgaris*)? Except in the peculiarity of the mouth, it is certainly very like it; but our young Garfish of the year taken in December, when they are about seven inches long, specimens of which I possess, have the upper jaw of the same comparative length as the lower one. Another season or two will probably decide the question, and it will be as interesting, in an ichthyological point of view to be able to determine this to be the young state of *Belone* as that there exists a true *Hemiramphus* in the seas of Europe.

The two examples obligingly sent me by Dr. Clarke, are too young and too minute to make any attempt to define specific characters desirable, beyond such as the remarks of Mr. Couch, and the representation here given will supply; and I only propose, for distinction's sake, that it should be called *Hemiramphus Europæus*.



THE GREATER FLYING FISH.

Exocætus exiliens.

Hirundo,	Belon, p. 195.
Mugil alatus.	Rondelet, Lat. E. p. 267.
Muge volant,	" Fr. E. p. 211.
,, ,,	Will, tab. P. f. 4.
Muge volant,	Duhamel, Pl. 2, Sec. 8, pl. 6, f. 3.
Hirondelle de mer,	,, Pl. 2, Sec. 3, pl. 22, f. 2.
Exocætus exiliens,	*Le Muge volant,* Bloch, pt. 12, pl. 397.

In a Cornish Fauna, by Jonathan Couch, Esq. which has recently been published for the Royal Institution of Cornwall, Mr. Couch has included a species of Flying Fish which threw itself on to the Quay at Plymouth, and the specimen is still preserved. From an inspection of this example Mr. Couch was enabled to determine that it was the Greater Flying Fish, *Exocætus exiliens*, or *Le Muge volant* of Bloch, the well-known species of the Mediterranean; and Mr. Couch adds, that he has reason to believe, from the dimensions as

given to him by the possessor, that the individual Flying Fish which was found at Helford, where it was discovered on the sand, having just then expired, was of the same species. This specimen, which is in the possession of Mr. John Fox of Plymouth, measures sixteen inches in length.

The elongated ventral fins, placed very far backwards, readily serve to distinguish this fish, which has long been well known in the Mediterranean, and was, I believe, first figured by Belon in the year 1553, by Rondelet in his Latin edition in 1554, and in the French edition printed at Lyons in 1558. For the general habits of the Flying Fish, the reader may consult the first volume of the History of British Fishes, page 398. Bloch says that the Greater Flying Fish attains the length of eighteen inches; and the specimen from which the representation in the work of Duhamel was taken, measured sixteen inches. Bloch says this fish is found in the Red Sea as well as in the Mediterranean. Our countryman Willoughby saw it in Calabria. Rondelet states that it is found in quantity at the mouth of the Rhone, and Duhamel mentions that, besides being plentiful in the Mediterranean, it had also been taken in the ocean. The flesh of this fish is rich, and is said to be more delicate than that of the herring.

The head is wide and flat on the top, but somewhat angular underneath; the mouth is small, the lower jaw rather longer than the upper; both jaws are furnished with pointed teeth, those in the lower jaw being the smaller of the two; the eyes are large, the irides silvery, the pupil dark blue; the nostrils large, and placed rather nearer to the eye than to the point of the nose; the operculum has the appearance of polished steel; the body of the fish is covered with large scales, which adhere but slightly; the upper part of the body is a fine blue colour, the lower part silvery white; the lateral line is placed very low down and runs throughout its whole length, but little above, and parallel to, the ventral profile; the pectoral

fins are very large and of a fine transparent blue colour; the ventral fins long, and almost rounded at the end; the dorsal and anal fins are falcate, beginning and ending nearly on the same plane; the tail consists of two unequally sized lobes, of which the lower lobe is the larger. The fin ray formula, according to Bloch, is

B. 10: D. 11: P. 18: V. 6: A. 12: C. 22.

According to M. Risso, the female is heavy with roe in the spring, and is remarkable for the variations that occur in the number of the rays of her fins.

END OF THE SUPPLEMENT TO THE FIRST VOLUME.

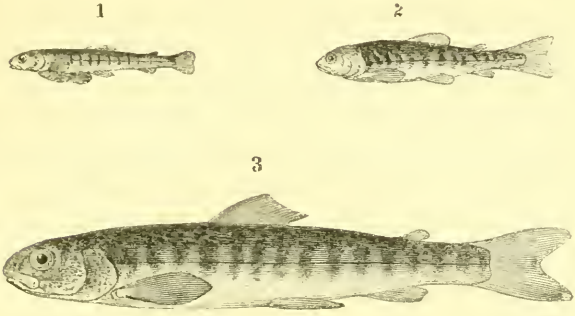
London: Printed by Samuel Bentley, Bangor House, Shoe Lane.

SUPPLEMENT

TO THE SECOND VOLUME OF THE

HISTORY OF BRITISH FISHES.

ABDOMINAL MALACOPTERYGII. *SALMONIDÆ.*



THE SALMON.

Salmo salar, Auctorum, British Fishes, vol. ii. p. 1.

Since the publication of that part of the History of British Fishes which contains an account of the Salmon, Mr. John Shaw of Drumlanrig, Dumfriesshire has printed in the Edinburgh New Philosophical Journal for July 1836 and January 1838, detailed particulars of various interesting and valuable experiments, made by himself, on the developement and growth of the fry of the Salmon, from their exclusion from the *ova* to the age of seven months.

Three ponds, varying in size, one eighteen feet by twenty-

two, the second eighteen feet by twenty-five, and the third thirty feet by fifty, were prepared at a convenient distance from a Salmon river, (the Nith,) the ponds two feet deep, thickly embedded with gravel, and supplied from a small stream of spring water, in which the larvæ of insects were abundant. The distance from the river to the ponds is stated as rather less than fifty yards, a proximity, it is observed, "sufficient to place the young fish confined in them on a similar footing with those in the river, so far as situation is concerned. The average temperature of the water is also nearly the same in both; that of the rivulet, however, being rather higher and less variable than that of the Nith." The experiments were conducted with great care. The ponds being prepared, the next object was to secure the fish, the progeny of which were to form the subject of observation. "With the view, therefore, of securing two Salmon, male and female, while engaged in the performance of the act by which the species is propagated, Mr. Shaw provided himself with an iron hoop five feet in diameter, on which he fixed a net of a pretty large mesh, so constructed as to form a bag nine feet in length by five feet in width. The hoop and net were then attached to the end of a pole nine feet long, thus forming a landing net on a large scale. The weight of the net with its iron hoop being upwards of seven pounds, it instantly sunk to the bottom when thrown into the water."

"Being thus prepared with the means of carrying his experiment into execution, Mr. Shaw proceeded to the river Nith on the 27th January 1837, and readily discovered a pair of adult Salmon depositing their spawn. Before proceeding to take the fish, he formed a small trench in the shingle by the edge of the stream, through which he directed a small current of water from the river two inches deep. At the end of this trench was placed an earthenware basin of considerable size, for the purpose of ultimately receiving the

ova. The fish were then, at one instant, both enclosed in the hoop, and allowed to find their way into the bag of the net by the aid of the stream. Having drawn them ashore, the female, while still alive, was placed in the trench, and a quantity of the *ova* pressed from her body. The male was then placed in the same situation, and a quantity of the milt being pressed from his body, passed down the stream, and thoroughly impregnated the *ova*. The spawn was then transferred to the basin, and deposited in the stream of the feeder to the first pond. The temperature of the stream was 40 deg., and that of the river from which the Salmon were taken 36 deg. The skins of the parent Salmon were preserved and exhibited, that no doubt as to the species might be entertained. The weight of the male when taken was sixteen pounds, and that of the female eight pounds."

Without following Mr. Shaw through the details on this, as on three or four other occasions, it may be sufficient to state, that the young fish ruptures the external capsule of the *ovum*, or may be said to be hatched in about

114	days when the temperature of the water is				36°
101	,,	,,	,,	,,	43°
90	,,	,,	,,	,,	45°

When first emerging from the membrane within which the young fish has been enclosed, the remains of the yolk or vitelline portion of the *ovum* is still attached by its own capsule to the abdomen of the fish as represented in the figure No. 1, which is taken from a specimen given me some years ago by Sir William Jardine. The remains of the yolk supplies nourishment to the young fish till it is able to take food by the mouth. Mr. Shaw has ascertained that the yolk is absorbed in twenty-seven days. At the end of two months the young fish is one inch and one quarter long, and the figure No. 2 is from Mr. Shaw's representation. At the end of four months the young fish measures two inches and a half

in length, and at the end of six months it had attained the length of three inches and three quarters.

From these experiments Mr. Shaw infers, that the growth of the young of the Salmon has been much overrated; that as the young Salmon in its progress assumes at a certain age the markings and colour of the Parr; that the Parr, as a distinct species, does not exist; and finally, that the young of the Salmon do not go down to the sea till they are more than twelve months old at the least, that is sometime during their second year, if not still later than that.

That the young of the Salmon, from their particular appearance at a certain age, have been constantly called Parrs, I readily admit; but so have also the young of two other migratory species, *S. trutta* and *S. eriox;* I think, therefore, that this is not conclusive evidence of the non-existence of a distinct small fish, to which the name of Parr ought to be exclusively applied; it rather shows the want of power among general observers to distinguish between the young of closely allied species, three or four of which are indiscriminately called Parrs.

That the rate of growth in the young of the Salmon has been exaggerated may be very true; but the rate of the growth of the fry in Mr. Shaw's ponds cannot be expected to equal that which would have taken place in the open river. Circumscribed in space over which to roam, and limited in food, as to variety at least, if not in quantity, in small ponds, the growth would be retarded in proportion; and this circumstance seems proved by Mr. Shaw's own remark, in which he states that the fish in the third pond (the largest pond of the three) "were considerably larger than those in the first pond, the difference in length at the age of six months amounting to an inch, or more than one fifth.

That the young fish do not go down to the sea till their second year, I am willing to believe on Mr. Shaw's authority,

because he has devoted great attention to the subject, and has for years had opportunities for observation which give great weight to his opinion. I have thus purposely adverted to the experiments of Mr. Shaw on account of their great interest, merit, and value; and because I am now enabled, through the kindness of Thomas Lister Parker, Esq., to offer a continuation of remarks on the growth of the Salmon in fresh water, which illustrate and confirm some of the views of Mr. Shaw; and in order to prevent any misconception of the terms employed, I shall speak of the young Salmon of the first year as a Pink; in its second year, till it goes to sea, as a Smolt; in the autumn of the second year as Salmon Peal, or Grilse, and afterwards as adult Salmon.

In the autumn of the year 1835, Thomas Upton, Esq. of Ingmire Hall, situated between Sedbergh and Kendal, began to enlarge a lake on his property, and in the spring of 1836, some Pinks from the Lune, a Salmon river which runs through a valley not far from the lake, were put into it. This lake, called Lillymere, has no communication with the sea, nor any outlet by which fish from other waters can get in, or by which those put in can get out. The Pinks when put into Lillymere did not certainly weigh more than two or three ounces each. Sixteen months afterwards,—that is, in the month of August 1837, Thomas L. Parker, Esq. then visiting his friend, fished Lillymere, desirous of ascertaining the growth of the Pinks, and with a red palmer fly caught two Salmon Peal in excellent condition, silvery bright in colour, measuring fourteen inches in length, and weighing fourteen ounces. One was cooked and eaten, the flesh pink in colour, but not so red as those of the river; well flavoured, and like that of a Peal. The other was sent to me in spirit of wine, and a drawing of it immediately taken. In the month of July 1838, eleven months after, another small Salmon was caught, equal to the first in condition and colour,

about two inches longer and three ounces heavier. No doubt was entertained that these were two of the Pinks transferred to the lake in the spring of 1836, the first of which had been retained sixteen months, and the other twenty-seven months, in this fresh-water lake.

Desirous of ascertaining the appearance of the young Salmon at periods intermediate between the states as Pinks and Salmon Peal, other experiments were tried. Pinks in the river Hodder in the month of April are rather more than three inches long, and are considered to be the fry of that year: at this time, Smolts of six inches and a half are also taken. The smolts are considered as the fry of the previous year, and are distinguished by the blue colour on the upper half of their body, the silvery tint of the lower half, and the darker hue of the fins generally as compared with those of the Pink. In this state as to colour, the Smolts are said to have assumed their migratory dress and go down to the sea in May. In June the young Pink in the Hodder measures about four inches; in July it measures five inches, and no Smolts are then found in the river. To be further convinced of this change, and the length of time required to produce it, a Pink put into a well at Whitewell* in the forest of Bowland in November 1837, was taken out in the state of a Smolt of six inches and a quarter in July 1838. In another instance more Pinks by Mr. Upton's directions were put into Lillymere in September 1837, and Mr. Parker caught five or six in the state of Smolts of seven and a half inches in August 1838. In referring to the particular size of the Pinks in the river Hodder at stated periods, it may be necessary to remark that the Pinks of different rivers, and even in the same river, will be found to vary in size, depending on the time at which the spawn was deposited, the temperature of the season, and other causes.

* For a view of Whitewell, see British Fishes, vol. ii. p. 88.

I may here observe that I am indebted to the kindness and liberality of Thomas Lister Parker, Esq. for a variety of specimens, as well as for the requisite information concerning them. Of the various fishes, when received, accurate drawings were immediately made, and coloured representations of six examples at different ages, in illustration of this subject, are in preparation, and may be had distinct from this supplement.

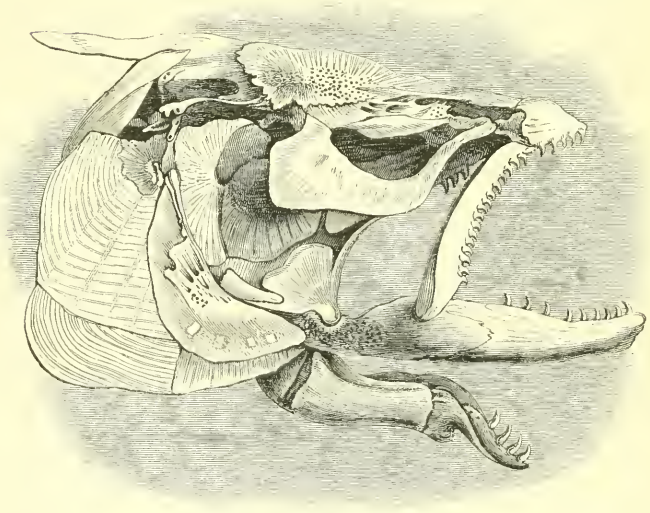
A knowledge of the growth of young Salmon in a fresh-water lake, as here described, and the experiment has succeeded elsewhere,* may be useful to those gentlemen who possess lakes near Salmon rivers from which they can supply them with Pinks: whether the Salmon thus prevented going to salt water will still retain sufficient constitutional power to mature their roe, and by depositing it in the usual manner, as far as circumstances permit, produce their species, would be a subject worthy of further investigation. That the rate of growth in young Salmon has some reference to the size of the place to which they are restricted, as hinted when describing Mr. Shaw's experiments, receives further confirmation in these river, lake, and well specimens. The Smolt taken from the well in July 1838, where it had been confined for eight months, was rather smaller in size at that time than the Smolts in the Hodder in the preceding April, though both were Pinks of the same year, namely 1837. The Smolt taken from the lake in August 1838, which then measured seven inches and a half, had also grown more rapidly than that in the well, but had not acquired the size it would have gained had it been allowed to go to sea. Further, it may be observed, that the Salmon Peal from the lake in August 1837, then eighteen months old, though perfect in colour, is small for its age; while that of July 1838, or twenty-nine months old, is comparatively still more defi-

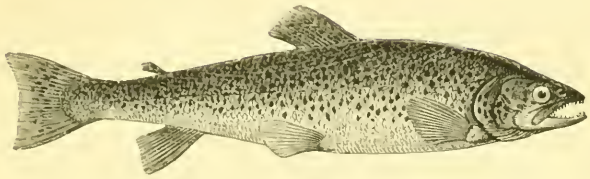
* See British Fishes, vol. ii. p. 21.

cient in growth, supposing both fish to have resulted from Pinks of the year 1836, and put into the lake at the same time; of which there was no doubt, since the lake, the formation of which, though commenced in the autumn of 1835, was not finished till February 1836, soon after which the first Pinks were put in.

In March 1839, Mr. Upton put six dozen Charr from Windermere into his lake.

The vignette represents the bones of the head in the Salmon.





THE LOCHLEVEN TROUT.

Salmo Levenensis, Walker.
,, *cæcifer*, Parnell.

I am indebted to Dr. Parnell for the loan of a beautiful specimen of this Trout from which the figure was taken, and the following account of it by Dr. Parnell is from the seventh volume of the Memoirs of the Wernerian Natural History Society of Edinburgh.

"This fish is considered by most writers on British Ichthyology to be identical with *Salmo fario*, the common Trout, differing from it only in the colour of the flesh, and in having no red spots on the sides. It is true that food and season may have a great share in diminishing or increasing the external markings and colour of the flesh ;* but they can have no effect in shortening or lengthening the rays of the fins, or in adding numbers to the cæcal appendages."

"The differences that exist between *S. cæcifer* and *S.*

* James Stuart Monteath, Esq. of Closeburn, caught a number of small river Trout, and transferred them to a lake (Loch Ettrick) where they grew rapidly ; their flesh, which previously exhibited a white chalky appearance, became in a short time of a deep red, while their external appearance remained the same from the time they were first put in.

fario are very striking. The pectorals in *S. cæcifer* when expanded are pointed, in *S. fario* they are rounded. The caudal fin in *S. cæcifer* is lunated at the end; in *S. fario* it is sinuous or even. *S. cæcifer* has never any red spots; *S. fario* is scarcely ever without them. The caudal rays are much longer in *cæcifer*, than in *fario*, in fish of equal length. In *S. cæcifer* the tail fin is pointed at the upper and lower extremities; in *S. fario* they are rounded. The flesh of *S. cæcifer* is of a deep red, that of *S. fario* is pinkish and often white. The cæcal appendages in *S. cæcifer* are from sixty to eighty in number; in *S. fario* I have never found them to exceed forty-six."

"Lochleven (of which the barren isle and now dismantled castle are famous in history as the prison-place of the beautiful Queen Mary) has long been celebrated for its breed of Trout. These, however, have fallen off of late considerably in their general flavour and condition, owing, it is said, to the partial drainage of the Loch having destroyed their best feeding ground, by exposing the beds of fresh-water shells, the animals of which form the greater portion of their food.* They spawn in January, February, and March."

"The fish described does not appear to be peculiar to this Loch, as I have seen specimens that were taken in some of the lakes in the county of Sutherland with several other Trout, which were too hastily considered as mere varieties of *S. fario*. It is more than probable that the Scottish lakes produce several species of Trout known at present by the name of *S. fario*, and which remain to be further investigated."

Dr. Richardson, who has had opportunities of examining very fine specimens of this celebrated Trout, considers it distinct from *S. fario*, and has pointed out some of the differences between them: the scales are thick, and when dry

* There are two or three varieties of *S. fario* in Lochleven with white and pinkish flesh, which are much inferior in flavour to *S. cæcifer*.—Encyc. Brit.

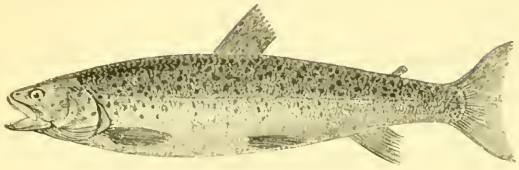
exhibit a small ridge in the centre of each, not perceived in other Trout: in its large and strong fins, and in its habit, as stated by Dr. Parnell, of spawning in spring, it differs from *S. fario*, which spawns in autumn, and resembles some of the large species of Trout of the great northern lakes. Three individuals of the Lochleven Trout dissected by Dr. Richardson had each seventy-three pyloric cæca, and in one of them fifty-nine vertebræ were counted. The largest of the specimens measured twenty inches and a quarter, including the caudal fin, and two inches less to the end of the scales.

Dr. Parnell's description, taken from a specimen measuring one foot in length, is as follows:—"Head rather more than one-fifth of the whole length; caudal fin included; depth between the dorsal and ventral fins less than the length of the head. Gill cover produced behind; basal margin of the operculum oblique; preoperculum rounded; end of the maxillary extending back as far as the posterior margin of the orbit. Colour of the back deep olive green; sides lighter; belly inclining to yellow; pectorals orange, tipped with grey; dorsal and caudal fins dusky; ventral and anal fins lighter; gill cover with nine round dark spots; body above the lateral line with seventy spots; below it ten; dorsal fin thickly marked with spots of a similar kind; anterior extremities of the anal and dorsal fins without the oblique dark bands which are so conspicuous and constant in many individuals of *S. fario*. First dorsal fin placed half-way between the point of the upper jaw and a little beyond the fleshy portion of the caudal extremity of the body; all the rays branched except the two first; the third ray the longest, equalling the length of the long caudal ray; the seventh as long as the base of the fin; the last considerably more than half the length of the third, equalling the length of the middle caudal ray; fin even at the end (in many specimens it is concave, with the last ray longer than the preceding one); caudal fin crescent-shaped,

the middle ray rather more than half the length of the longest ray; third ray of the anal fin the longest, equalling the length of the fifth dorsal ray; the last ray as long as the base of the fin, ventral fin equalling the length of the fifth ray of the anal; the third ray the longest; third ray of the pectorals equalling the length of the long caudal ray; the last ray half the length of the fin. Teeth stout and sharp, curved slightly inwards; thirty-two in the upper jaw, eighteen on the lower; twelve on each palatine bone; thirteen on the vomer; and eight on the tongue. Scales small and adherent; twenty-four in an oblique row between the middle dorsal ray and the lateral line; flesh deep red; cæca eighty. The number of fin rays.

D. 12: P. 12: V. 9: A. 10: C. 19.

The vignette represents the castle and the island in Loch-leven.



THE GREAT LAKE TROUT,

OR GREAT GREY TROUT.

Salmo ferox, Jardine and Selby, and British Fishes, vol. ii. p. 60.

Since the publication of the History of British Fishes, in which the existence of the Great Lake Trout in Lough Neagh, was recorded as ascertained by Mr. Thompson of Belfast, that gentleman, following up his zoological researches, has learned that this fish exists in Lough Corrib, in the county of Galway, and also in Lough Erne, in the county of Fermanagh, thus proving it, to use Mr. Thompson's words, to be an inhabitant of the three largest lakes in Ireland, and it will probably yet be found in most of the lakes of any considerable extent in that country. Mr. Thompson has very kindly supplied me with a young fish of this species from which our representation was taken, and which, differing from specimens of large size in having the spots more numerous, may be an acceptable addition. As mentioned in the former volume, this Lake Trout, when small, is in Ireland called a *Dolachan ;* when large a *Buddagh*, and they are usually caught on night lines baited with a perch or a pollan. The mode of taking this fish in

the large Lochs of Scotland is given in the second volume of the British Fishes, page 61.

I have reason to believe that this same species of Great Grey Trout is an inhabitant of some of the large lakes of Scandinavia.

Sir Thomas Maryon Wilson, Bart. visited Sweden last summer, ascending the Gota river in his yacht, the Syren, and passing through the celebrated sluices of Tröllhattan, cruised and fished in Lake Wenern, visiting his friend Mr. Lloyd, who resides near the southern extremity of this noble lake.

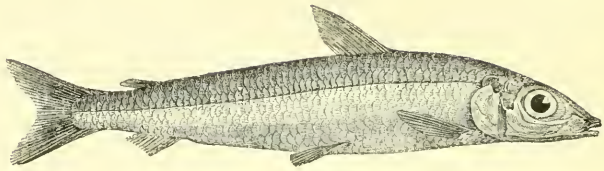
Sir Thomas M. Wilson brought back with him five or six skins of the Great Trout of the lake, which were caught by spinning with a bleak, and must, from their large size, have afforded some excellent diversion. The largest of these specimens measured forty-two inches in length, and weighed about thirty-four pounds: the next largest weighed thirty-two pounds: the third twenty-seven pounds, besides others of smaller size. These large Trout, and larger than these are seldom seen, are observed to be males; the females, according to Mr. Lloyd, who has lived for some years on the borders of the lake, rarely exceed twenty or twenty-two pounds. The number of fin rays in these specimens averaged

D. 13: P. 14: V. 9: A. 11: C. 19.

Among other fish taken by Sir Thomas Wilson, was a large specimen of the Ide, *Leuciscus idus* of authors. This fish, which resembles our English Chub, was caught in the Gotha Elf, a short distance above the falls of Tröllhattan, whilst trolling for pike on a windy day: its weight was between four and five pounds. The skins of these various specimens were effectually preserved and mounted after they were brought to England.

Sir Thomas M. Wilson did me the favour to show me his numerous sketches of scenery, taken during this trip, which include views of the Gota river, the cities and country on its

banks, the celebrated falls of Tröllhattan and parts of Lake Wenern at different points of view; very kindly allowing me the use of a coloured drawing from which the vignette below, on a reduced scale, was taken. This view represents Mr. Lloyd's cottage on the eastern bank of the Gota; the yacht of Sir Thomas Wilson lying at anchor immediately opposite; with the remarkable and finely wooded hills of Hunneberg and Halleberg, so much celebrated for the peculiarity of their geological structure, bounding the distance.



THE HEBRIDAL SMELT.

Osmerus Hebridicus, *Hebridal Smelt*, Yarrell, Supplement to Brit. Fishes.

I am indebted to Mr. William Euing of Glasgow for the opportunity of making known a new species of Smelt which that gentleman did me the kindness to send to me in the month of November 1837. This fish is at once clearly distinguishable from our long-known and highly-esteemed favourite, the common Smelt, and is the more interesting from the circumstance of its being—at least, as far as I am aware—entirely new to Ichthyology. Mr. Euing passed part of the summer of 1837 near Rothsay in the Isle of Bute; and the Smelt in question was brought to him by a fisherman, who stated that he caught it on a hand line in the bay of Rothsay, about two hundred yards from the shore, in twelve fathom water; that it was, though well known, but rarely seen. This specimen measured six inches and a half; but another example of the same sort, measuring eight inches in length, that was taken near the same place in June 1836, was full of roe, and when first caught the cucumber-like smell, so peculiar to the Smelt, was in this species also very apparent.

Unable to find any notice of a second species of Smelt in Europe in any Ichthyological work with which I am acquainted, I have little doubt that this fish has not been previously described; and in reference to the locality in which alone it has been as yet taken, I have ventured to name it the Smelt of the Hebrides, *Osmerus Hebridicus*.

The specimen sent me by Mr. Euing, measuring six inches and a half in length, is one inch and one eighth deep at the commencement of the dorsal fin, at which part the body is deepest; the thickness of the body compared to the depth is as one to two, or exactly half: the length of the head is one inch and three eighths, and is, in reference to the whole length of the head and body, without the tail, as one to four. The jaws are nearly equal in length, without teeth upon either; but there are four long teeth upon the tongue; the eye is very large, the diameter almost equal to one third of the whole length of the head, and placed at a distance of little more than its own diameter from the point of the nose: the upper surface of the head is flattened, descending by a rapid slope to the nose; the line of the lower jaw straight; the posterior edge of the operculum rounded; the back of the fish, or its dorsal outline, slightly arched; the abdominal line nearly straight; the sides compressed. The dorsal fin commences half way between the point of the nose and the anterior edge of the adipose or rayless dorsal fin, the longest ray nearly twice the length of the base of the fin; the last dorsal fin ray but three, the same length as the base of the whole fin. The adipose fin is placed very near the tail; the tail itself deeply forked. The pectoral fin reaches to the plane of the commencement of the dorsal, and its length, if turned forwards, would reach to the centre of the eye. The ventral fin is in a vertical line under the last ray of the dorsal fin; there is a slender axillary scale; but the ends of the ventral fin rays being injured, the length of the fin cannot be mentioned.

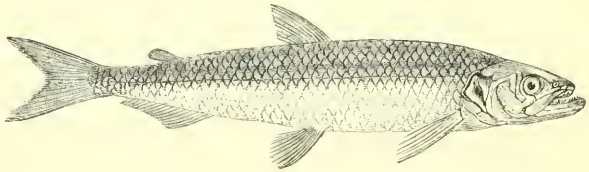
The anal fin has its last ray underneath the posterior edge of the adipose fin; but the rays of the anal fin are also broken. The formula of the fin rays is as follows :—

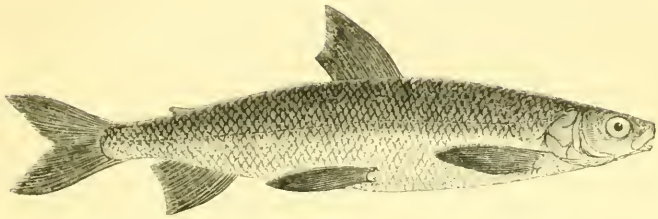
D. 11 : P. 14 : V. 12 : A. 12 : C. 19.

The scales are large and deciduous, the lateral line prominent and nearly straight. Below the lateral line for the whole length of the body two rows of the scales are silvery white, forming a conspicuous elongated band, like that to be observed in the Atherine,* the rest of the body and fins dull amber colour, the gill covers silvery and iridescent.

The figure of our well-known common Smelt is inserted as a vignette to exhibit the comparative characters of the two species.

* British Fishes, vol. i. p. 214.





THE POWAN.

Coregonus La Cepedei, *The Powan*, Parnell, Annals of Nat. Hist. vol. i. p. 161.

,, *clupeoides*, *The Herring-like Coregonus*, Lacepede, Hist. Nat. du Poiss. 8vo edit. tom. x. p. 386.

Dr. Parnell, whose Ichthyological investigations in Scotland have not been confined to the "Fishes of the Forth," only, has described in the first volume of the Annals of Natural History a species of *Coregonus*, to which he has attached the name of *Lacepedei*, this species having been first noticed, or perhaps distinguished, by this celebrated French naturalist. This fish is found in Loch Lomond, one of the largest and most picturesque lakes in the west of Scotland. It is not unlikely that some of the species of *Coregoni* found in the northern lakes of England, Scotland, and Ireland, may exist in the lakes of Scandinavia, M. Nilsson, Professor of Natural History at Lund, describing in his *Prodromus Ichthyologiæ Scandinavicæ* no less than eight species as belonging to that country; but from a certain general agreement in

the characters of the *Coregoni*, it is difficult to refer our species with certainty in the absence of foreign specimens with which to make actual comparison.

It appears, on reference to his Natural History of Fishes, that Lacépède became aware of the existence of this *Coregonus* in Loch Lomond by the communication of M. Noel, who visited Scotland in August 1802. Although some little differences appear in the descriptions of this fish, as given by Lacépède and Dr. Parnell, there is little doubt that both authors had the same species under consideration. This fish bears, as observed by Dr. Parnell, considerable resemblance in appearance and also in the number of its fin-rays to the *Salmo Wartmanni* of Bloch, part 3, tab. 105, a species of *Coregonus*, named after a learned physician, who first described it. It is found in some of the lakes of Switzerland, and also in lake Constance; but Lacépède, to whom the *Wartmanni* was known, considered the Loch Lomond *Coregonus* distinct. It is thus described by Dr. Parnell, from a specimen fourteen inches in length.

"Head long and narrow, of an oval form, about one-fifth the length of the whole fish, caudal fin included; depth of the body between the dorsal and ventral fins less than the length of the head. Colour of the back and sides dusky blue, with the margin of each scale well defined by a number of minute dark specks; belly dirty white; the lower portion of the dorsal, pectoral, ventral, and anal fins dark bluish grey; irides silvery, pupils blue. First ray of the dorsal fin commencing half-way between the point of the snout and the base of the short lateral caudal rays; the first ray simple, the rest branched; the second and third the longest, equalling the length of the pectorals; the seventh ray as long as the base of the fin; the last ray one-third the length of the fourth; adipose fin large and thin, situate midway between the base of the fourth dorsal fin-ray and the tip of the long

upper ray of the caudal fin; anal fin commencing half way between the origin of the ventral fin and the base of the middle caudal ray; the first ray simple, the rest branched; the second rather the longest; the third as long as the base of the fin; the last ray half the length of the fifth; ventral fins commencing under the middle of the dorsal; the third ray the longest, equalling the length of the same ray of the dorsal; pectorals long and pointed, one-sixth the length of the whole fish, caudal fin included; the first ray simple; the second and third the longest, the last short, not one-fourth the length of the first; tail deeply forked, with the long rays of the upper portion curving slightly downwards, giving the fin a peculiar form. Gill cover produced behind; the basal line of union between the operculum and subopercule oblique; the free margin of the latter slightly rounded; preoperculum angular; snout prominent, somewhat of a conical form, extending beyond the upper lip; jaws of unequal length, the lower one the shortest. The maxillary bone broad, the free extremity extending back to beneath the anterior margin of the orbit. Teeth in the upper jaw long and slender, about six in number; those on the tongue shorter and more numerous. Eyes large, extending below the middle of the cheeks; lateral line commencing at the upper part of the operculum, and running down the middle of the sides to the base of the middle caudal ray. Scales large and deciduous, eighty-four forming the lateral line, eight between the dorsal fin and lateral line, and the same number between the lateral line and the base of the ventrals." The numbers of the fin-rays, including the two short rays at the commencement of the dorsal and anal fins, are

D. 14 : P. 16 : V. 12 : A. 13 : C. 20 : cæca 120.

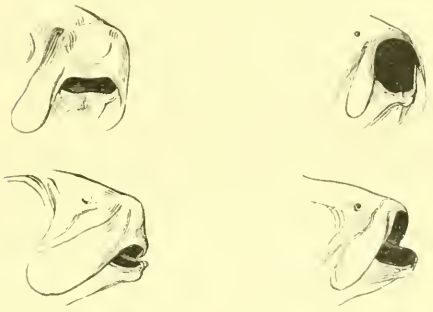
"This fish grows occasionally to the length of sixteen inches. In the stomach of one of the specimens examined

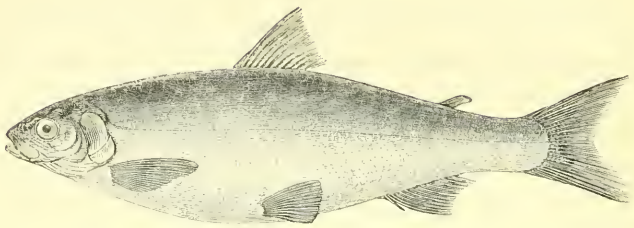
were found several species of *Entomostraca*, larva of insects, a few *Coleoptera*, a number of small tough red worms, little more than half an inch in length, and about the thickness of a coarse thread, besides a quantity of gravel, which the fish had probably accumulated when in search of the larva."

"These fish are found in Loch Lomond in great numbers, where they are called *Powans* or *Freshwater Herrings*. They are caught from the month of March until September with large drag-nets, and occasional instances have occurred in which a few have been taken with a small artificial fly: a minnow or bait they have never been known to touch. Early in the morning and late in the evening large shoals of them are observed approaching the shores in search of food, and rippling the surface of the water with their fins as they proceed. In this respect they resemble in their habits the Vendace of Lochmaben and the saltwater herring. They are never seen under any circumstances in the middle of the day. From the estimation these fish are held in by the neighbouring inhabitants, they are seldom sent far before they meet with a ready sale, and are entirely unknown in the markets of Glasgow. In the months of August and September they are in best condition for the table, when they are considered well flavoured, wholesome and delicate food. They shed their spawn in October to December, and remain out of condition until March."

Although agreeing in the number of fin-rays with the Pollan of Ireland, this Loch Lomond fish is at once distinguished from it by the peculiar form of its mouth, a representation of which, in two points of view, inserted as a vignette, and contrasted with the same parts in the Pollan, both of the natural size, will, better than description, convey the appearance in proof of distinction. The Loch Lomond fish being remarkable for the depth of the upper lip, and the large size of the lateral free portions of the superior-maxillary bones.

Dr. Parnell has described a second species of *Coregonus* found in Loch Lomond, which differs from the first in having a smaller head, yet agreeing exactly in the number of all the fin-rays; but as I learn by communication with Dr. Parnell that since the publication of his paper he has obtained many specimens from Loch Lomond, the characters of which are intermediate in reference to the two fishes described, and appear to connect them, I have not figured it as a distinct species.





THE POLLAN.

Coregonus Pollan, *The Pollan*, Thompson, Proceedings Zool. Soc. for 1835, p. 77; and Magazine of Zool. and Bot. vol. i. p. 247.

A short notice of the Pollan of Ireland, as made known by Mr. Thompson of Belfast in 1835, was inserted in the History of British Fishes, vol. ii. p. 88; and that gentleman having most zealously followed up his zoological investigations in that country, I am now enabled to add from his researches various further particulars.

"The earliest notice of the species that I have seen," says Mr. Thompson, "is in Harris's History of the County of Down, published in the year 1744, where, as well as in the statistical surveys of the counties of Armagh and Antrim, it has subsequently been introduced as one of the fishes of Lough Neagh, under the name of Pollan: but, as may be expected in works of this nature, little more than its mere existence is mentioned."

"The habits of this fish do not, with the exception of its having been in some instances taken with the artificial fly,

differ in any marked respect from those of the Vendace of Scotland or the Gwyniad of Wales, and are in accordance with such species of continental Europe as are confined to inland waters, and of whose history we have been so fully informed by Bloch. The Pollan approaches the shore in large shoals, not only during spring and summer, but when the autumn is far advanced. The usual time of fishing for it is in the afternoon, the boats returning the same evening. On the days of the 23rd, 24th and 25th of September 1834, which I spent in visiting the fishing stations at Lough Neagh, it was along with the common and great lake trout, *Salmo fario* and *Salmo ferox*, caught plentifully in sweep-nets, cast at a very short distance from the shore. About a fortnight before this time, or in the first week in September, the greatest take of the Pollan ever recollected occurred at the bar-mouth, where the river Six-mile-water enters the lake. At either three or four draughts of the net, one hundred and forty hundreds,—one hundred and twenty-three fish to the hundred,*—or 17,220 fish were taken; at one draught more were captured than the boat could with safety hold, and they had consequently to be emptied on the neighbouring pier. They altogether filled five one-horse carts, and were sold on the spot at the rate of 3*s.* 4*d.* a hundred, producing 23*l.* 6*s.* 8*d.* From 3*s.* 4*d.* to 4*s.* a hundred has been the ordinary price at the lake side, or directly from the fishermen; some years ago it was so low as 1*s.* 8*d.* the hundred, but at that time the regular system of carriage to a distance, as now adopted, did not exist. At the former rates they are purchased by carriers, who convey them for sale to the more populous parts of the neighbouring country, and to the towns within a limited distance of the lake. They are brought in quantities to Belfast; and when the supply is good, the cry of 'fresh pollan' prevails even to a greater ex-

* The English long hundred is six score, or one hundred and twenty.

tent than that of 'fresh herring,' though both fishes are in season at the same period of the year. In the month of June 1834, fifty hundreds,—six thousand one hundred and fifty individuals—of pollan and one hundred and twenty-five pounds weight of trout were taken at one draught of a net, at another part of the lake near Ram's Island, which was the most successful capture made there for twenty-four years. In 1834 this fish was more abundant than ever before known. Like the Gwyniad and Vendace, the Pollan dies very soon after being taken from the water, and likewise keeps for a very short time. It is not in general estimation for the table, but is, I think, a very good and well-flavoured fish."

"Though permanently resident, the pollan is very far from being generally diffused throughout Lough Neagh. It rarely occurs between the river Mayola and Toone; while from the Six-mile-water to Shane's Castle is so favorite a resort, that a few houses that formerly stood near the latter locality, were dignified with the name of Pollan's Town."

"In the months of November and December this fish deposits its spawn where the lake presents a hard or rocky bottom. On the 4th of December 1835, a quantity of the largest Pollans I have seen were brought to Belfast market. Several were thirteen inches in length, and all on dissection proved to be females just ready to deposit their roe. On the 11th of the same month several male specimens of full size that I procured, and which contained milt most prominently developed, measured but eleven inches and a half,—thus showing that in maturity the female fish exceeds the male in length in the proportion of thirteen to eleven and a half. Its average weight when in season is about six ounces. One specimen, mentioned to me as the largest taken within the last ten years, weighed two pounds and a half. The only food that I have, without resorting to the microscope, detected in the stomach of the Pollan was a full grown speci-

men of the bivalve shell *Pisidium pulchellum*. A pebble of equal size was also found with it." In the stomach of a specimen given me by Mr. Thompson I found a species of *Gammarus*. Mr. Thompson, in some more recent examinations, has found mature individuals of *Gammarus aquaticus*, and the larvæ of various aquatic insects; some shells of the genus *Pisidium*, one of the fry of the three-spined stickleback, and a few fragments of stone. Others were found to contain minute *Entomostraca*, two *Pisidia*, and a *Limneus peregeri*, this last was three lines in length.

Besides inhabiting Lough Neagh, the Pollan has also been found in Lough Derg, an expansion of the Shannon; and Lord Cole, who has most condescendingly interested himself in the History of British Fishes, had the kindness to send me a jar full of Pollan from Lough Erne in the county of Fermanagh, from one of which specimens our figure was taken. The Pollan of Lough Erne are rather deeper for their length than those of Lough Neagh. His lordship has also sent me two species of Charr from Ireland; some from Lough Eask being identical with the Charr of the Cumberland Lakes, while those from Lough Melvyn are short and deep fish with large fins exactly resembling the Charr found in two or three lakes in Wales, the particulars of both of which are described in the second volume of the British Fishes.

To return to the Pollan of Ireland, Mr. Thompson's description is as follows: "The relative length of the head to that of the body is about as one to three and a half; the depth of the body equal to the length of the head; the jaws equal in length, both occasionally furnished with a few delicate teeth; the tongue with many teeth; the lateral line sloping downwards for a short way from the operculum, and thence passing straight to the tail. Nine rows of scales from the dorsal fin to the lateral line, and the same number thence to

the ventral fin, the row of scales on the back and that of the lateral line not included. The third ray of the pectoral fin the longest. The fin-ray formula is as follows—

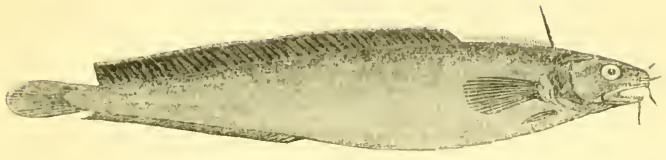
B. 9 : D. 14 : P. 16 : V. 12 : A. 13 : C. 59 : vertebræ 59.

Of these, the first two rays of the dorsal fin, and the first two rays also of the anal fin are short.

"The colour to the lateral line dark blue, thence to the belly silvery; dorsal, anal, and caudal fins, towards the extremity, tinged with black; pectoral and ventral fins of crystalline transparency, excepting at their extremities, which are faintly dotted with black. Irides silvery, pupil black."

In a number of these Pollan from Lough Erne as well as Lough Neagh, the base of the last ray of the dorsal fin is exactly half way between the point of the nose and the extreme end of the longest upper caudal ray. Nine rows of scales from the base of the first ray of the dorsal fin to the lateral line, and the same number from the lateral line to the origin of the ventral fin, with eighty-eight scales forming the lateral line. The fin-rays in number on several specimens exactly as stated by Mr. Thompson.

The vignette represents the bones of the cranium in the genus *Coregonus*.



THE FOUR-BEARDED ROCKLING.

Motella cimbria, The Four-bearded Rockling, Parnell, Wern. Mem. vol. vii. p. 449. pl. 44.
Gadus cimbrius, Linnæus, Syst. Nat. p. 440, sp. 16.
,, ,, Reiz, Faun. Suec. p. 323.
Enchelyopus cimbricus, Schneider, Syst. Ichth. p. 50, sp. 1, tab. 9.
Motella cimbrica, Nilsson, Prod. Ichth. Scand. p. 48, sp. 2.

This species of *Motella*, first described by Linnæus, is included by Dr. Parnell in his description of the Fishes of the Forth, a specimen, fourteen inches in length, having been brought to him by a Newhaven fisherman, who had caught it a little to the east of Inchkeith on a Haddock line baited with muscles. It is a species perfectly distinct from the Three or the Five-bearded Rocklings, so much more common on various parts of the coast, and may at once be distinguished from either by the greater length of the filament, which is placed in advance of the almost obsolete first dorsal fin. This filament in a fish of nine inches long, measures one inch and seven-eighths; and in another fish of ten inches and a half in length, measures two inches and a quarter, as I find from portions of two specimens

sent me by Mr. Euing of Glasgow, to whom I am indebted for the opportunity of making known the new species of Smelt. These two specimens of the Four-bearded Rockling were taken near Rothsay, and in reference to them Mr. Euing's letters contain the following remarks:—"I have never met with the Three or the Five-bearded Rockling, but small specimens of that with four cirri are frequently brought in on the long lines from deep water. It is, indeed, by no means a very rare fish with us, and I have seen it at almost every visit to the coast since 1827, the year in which I first observed it."

This fish is rare in the Baltic, but is not uncommon on the southern coast of Sweden; it is found also among the islands of the Catigat; on the west coast of Norway, and in the Atlantic.

Dr. Parnell says, on dissecting the specimen, I found the stomach filled with shrimps and small crabs. The cæcal appendages were few in number; the roe was large; the ova small and numerous, and apparently in a fit state to be deposited. It is probable that the habits of this fish are similar to those of the other species, but from its rarity it is difficult to determine."

Description by Dr. Parnell, from a specimen fourteen inches in length: "Form closely resembling that of the Five-bearded Rockling, but the length of the head somewhat greater compared to that of the body. The body elongated, rounded in front, compressed behind, tapering from the vent to the caudal extremity; greatest depth less than the length of the head. Head one-sixth of the entire length, caudal fin included, slightly depressed; snout blunt, projecting considerably beyond the under jaw; eye large, of an oval form, placed high up, and about its own length from the point of the nose; opercuhum rounded, oblique; gill-opening large;

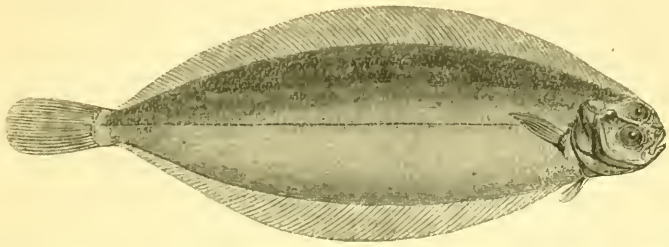
gape wide; maxillary extending in a line with the posterior margin of the orbit; teeth sharp and fine, forming two rows in the under jaw, and five rows in the upper; a few are also placed in a cluster on the anterior part of the vomer; barbules four, one a little in front of each nostril, one at the extremity of the upper lip, and one on the chin; tongue fleshy, smooth, and without teeth. Fins:—the first dorsal fin obsolete, scarcely discernible, commencing over the operculum, and terminating a little in front of the second dorsal, composed of a number of short, fine, capillary rays, of which the first is by far the largest; second dorsal taking its origin in a line over the ends of the pectorals, and terminating a little in advance of the caudal; anal fin commencing in a line under the twelfth ray of the second dorsal, and ending under the last ray but three of the same fin, in form similar to the second dorsal, but the rays scarcely more than one half the length; the first ray simple, the rest branched; caudal rounded at the extremity, the length of the middle rays equalling the space between the first and the twelfth rays of the anal, the lateral rays simple; ventral fins jugular, the second rays the longest, about two-thirds the length of the pectorals; the pectoral fins rounded at the extremities, equalling the length of the caudal; the first rays stout and simple, the rest branched. The fin-rays in number are,—

1st D. 50 : 2nd D. 50 : P. 16 : V. 5 : A. 43 : C 20. Vert. 52.

Scales small, smooth, and adherent, covering the head, body, and membranes of the dorsal, caudal, and anal fins; lateral line formed by a number of oval depressions, placed at intervals from each other, commencing over the operculum, taking a bend under the ninth, tenth, and eleventh rays of the second dorsal fin, from thence running straight to the middle ray of the caudal. Colours:—Back and sides of

a greyish brown; belly dirty white; second dorsal fin lighter in colour at the edge; pectorals, caudal, and lower part of the dorsal, dark brown, approaching to black; anal and ventrals dusky."

The vignette represents the cranium of the Common Cod-fish.



THE LONG FLOUNDER.

Platessa elongata, The Long Flounder, YARRELL, Suppl. to Brit. Fishes.

I AM indebted to Mr. Baker, of Bridgewater, for several interesting communications on Birds and Fishes, one of the most valuable of which is the opportunity afforded me of making known what appeared to that gentleman to be a species of Flounder undescribed as a British Fish, and which, after having made the usual search, I have reason to believe is not only undescribed as a British Fish, but is altogether new to Ichthyology. I have only as yet seen the single specimen sent me for my use on this occasion by Mr. Baker, from which a drawing has been made of the natural size, and the reduced representation here given engraved on wood; but I understand from Mr. Baker's son that his father had obtained a second example of the same fish. The specimen now before me was obtained at Stoford, in Bridgewater Bay, in the month of December. Little is of course known of the habits of so recent and so rare an acquisition.

The whole length of this specimen is seven inches and three-quarters; the length of the head one inch and one quarter, and compared to the whole length of the fish, as one to six; the greatest breadth of the body, dorsal and anal fins included, is one inch and three-quarters, and compared to the whole length of the fish, as one to four and a half; the breadth, including the dorsal and anal fin, is to the whole length as three to eight. The body very thin, and very much elongated in form; the lateral line passing straight from the tail along the middle of the fish till it approaches the operculum, then rises in a slight curve over the base of the pectoral fin. The scales on the body are of medium size, oval, with numerous radiating striæ on the free portion. The fins deep, and the tail long.

The outline of the whole head is rather circular, the mouth oblique from below upwards, and below the line of the longitudinal axis of the body; the jaws nearly equal in length, each furnished with a single row of small and regular teeth; the eyes rather large, the upper eye, or that on the left side, being a little in advance of the lower, or that on the right side; the inter-orbital bony ridge prominent; the boundary lines of the preoperculum and operculum forming two concentric portions of circles. The pectoral fin, arising immediately behind the edge of the operculum, is about half as long as the head; the ventral fin, in a line under the edge of the operculum, is about half as long as the pectoral fin. The dorsal fin, commencing with short rays in a line over the eye, is at its greatest elevation about the middle of the fish, and from thence diminishes gradually to the end, which is on the fleshy portion of the tail, and short of the origin of the caudal rays; the anal fin begins close to the ventral fin, immediately behind the post anal spine; the first and last rays short, those in the middle of the fin the longest, and the fin ends on the same plane as the dorsal. The tail is elongated; its

length equal to that of the head, and in form but slightly rounded at the end; the sides parallel.

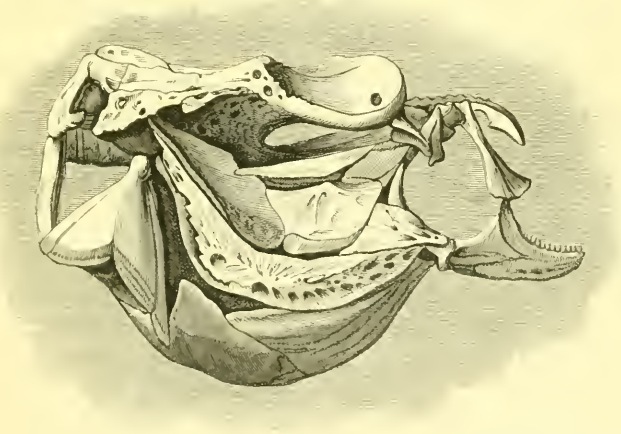
The fin-rays in number are,—

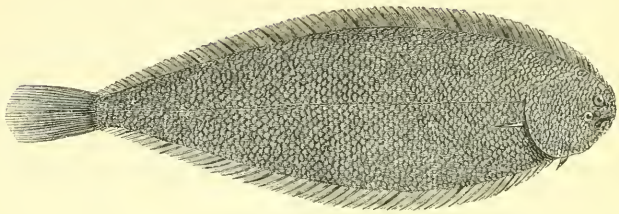
D. 110 : P. 11 : V. 6 : A. 96 : C. 24.

The colour of this specimen on the upper surface is a uniform pale brown, the membranes of the different fins being rather lighter in colour than the body of the fish; the under surface of the body very pale wood-brown; the irides yellow.

This specimen has been preserved dry.

The vignette below represents the cranium of the Common Flounder.





THE SOLENETTE,

OR LITTLE SOLE.

Monochirus linguatulus, Cuvier, Reg. An. t. ii. p. 343.
Solea parva sive lingula, Rondeletius, p. 324.
La petite Sole, ,, French Edit. Lyons, p. 260.
Solea parva sive lingula Rondeletii, Willoughby, p. 102, F. 8, fig. 1.
Pleuronectes lingula, Linn. Syst. Nat. p. 457, sp. 10.
Monochirus minutus, Parnell, Mag. Zool. and Bot. vol. i. p. 527.

At the time of writing the description of the Variegated Sole (British Fishes, vol. ii. page 262), I had not seen a specimen of the true *Solea parva sive lingula* of Rondeletius, and now find that I have included two distinct species in the synonymes employed to designate the Variegated Sole. The Rev. L. Jenyns, in his Manual of British Vertebrate Animals, appears to have suspected that there was a fourth species of Sole on our coast, since, at the conclusion of the description of his third species, he has observed, "further observation is necessary in order to decide whether, in this instance, I have confounded two nearly allied species."

In the published proceedings of the Royal Society of Edinburgh for January 1837, Dr. Parnell has figured and briefly described, under the name of *Monochirus minutus*, a

small species of Sole obtained by him at Brixham on the Devonshire coast, which appears to be the true *Solea parva sive lingula* of Rondeletius. This small fish is at once distinguished from the Variegated Sole of Donovan, and other English authors, by the tapering of the body towards the tail, and more particularly by the dorsal and caudal fins being united to the base of the tail, which is not the case in the Variegated Sole. This union of the two fins with the tail is shown in the figure given by Rondeletius, and again by Willoughby, as referred to.

Dr. Parnell has obtained several examples of this interesting little species, which is not unfrequently taken in the trawl-nets by the fishermen of Brixham, but on account of its diminutive size it is seldom brought on shore. It has evidently been confounded with the Variegated Sole; but, independently of other distinctions, the Variegated Sole has the tail separated from the dorsal and caudal fins by a considerable interval.

The Variegated Sole of Donovan and of Montagu's MS. the Red-backed Flounder of Pennant's Zoology, and the Variegated Sole of Dr. Fleming, are so many specimens of the truly Variegated Sole, and are each of them quite distinct from the true *lingula*. Duhamel appears to have distinguished and figured both species. Mr. Thompson has obtained both species on the coast of the North of Ireland, and by his kindness I have now his specimens before me for comparative examination. Dr. Parnell has given me two examples of his *Monochirus minutus*, which, as before observed, I believe to be the true *Solea parva sive lingula* of Rondeletius; and I have also two specimens of the true Variegated Sole; one of these, from which the figure in the British Fishes was drawn, has the dark clouded variation in colour extending, as in Donovan's figure, over the back as well as the fins: in a specimen belonging to Mr. Thompson,

in one of my own, and in Montagu's specimen, as described in his MS. the dark variations in colour are confined to patches on the fins, as in Pennant's figure; but without reference to colour, this species is immediately known by the space which occurs between the two elongated fins and the tail, which Montagu says was equal to half an inch in his specimen, which measured nine inches.

Both these species belong to the genus *Monochirus* of Cuvier, distinguished from those of the genus *Solea* by the very small size of the upper pectoral fin, and the very rudimentary state of the pectoral fin on the under side, and is, indeed, sometimes entirely wanting. Of our two British species of *Monochirus*, the *M. lingnatulus* of Cuvier has the smaller upper pectoral fin of the two, as observed by Mr. Thompson, who has, in a recent number of the Annals of Natural History, published some interesting details on the two British species of the genus *Monochirus*.

From the numbers of these fishes which are taken in the trawl-nets off Brixham throughout the whole year, says Dr. Parnell, and from their never appearing to attain a large size, there can be little doubt but that they are arrived at their full growth. The fishermen, who appear perfectly familiar with their appearance, call them Red Soles; and scarcely a trawl-boat leaves Brixham Harbour that does not capture a dozen or more of these fish daily; but, from their diminutive size, they are either thrown overboard, or left to decay at the bottom of the vessels.

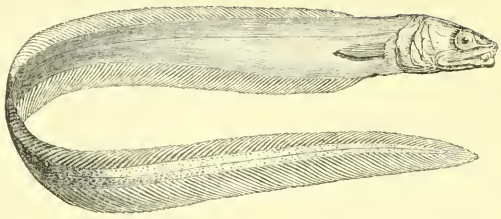
Description: — "Length five inches; the width at the upper third nearly two inches: the colour of the back light reddish brown, the under surface pale white; every sixth or seventh ray of the dorsal and anal fin black. In shape this fish is similar to the Common Sole, but is of a more wedge-shaped form, becoming narrow at the caudal extremity. The head is small, one-sixth of the whole length; the mouth

is crooked; each jaw is furnished with a number of minute teeth, placed close together, and extending but half way round the mouth; the eyes are small; the upper, or left eye, a little in advance. The dorsal fin commences immediately over the upper lip, and runs down the back, to be connected with the caudal rays; the anal fin begins under the posterior margin of the operculum, and continues to the tail. The number of the fin-rays are,—

D. 73 : P. 4 : V. 4 : A. 54 : C 14.

The scales are small, with from twelve to fifteen denticles at their free extremity, rendering the whole surface of the fish rough to the touch when the finger is passed along from the tail to the head. The pectoral fin, on the eye-side, is small, with the lower half black, while the fin on the opposite side is very minute, and of a pale white; the lateral line is straight throughout; the tail is rounded at the end, and mottled with brown."

The vignette represents the fishing-house at Virginia Water.



DRUMMOND'S ECHIODON.

Echiodon Drummondii, Thompson, Proceedings Zool. Soc. 1837, page 55.
,, ,, ,, Transactions ,, ,, vol. ii. part iii. p. 207, plate 38.

Generic Characters.—Head oval: jaws furnished with large cylindrical teeth in front, other smaller teeth on the palatal bones and on the vomer. Gill apertures large; branchiostegous membrane with seven rays. Body smooth, without scales, elongated, compressed. Dorsal and anal fins nearly as long as the body; all the rays soft; no ventral fins; anal aperture near the head.

A DEAD specimen of the fish figured above was found by Dr. J. L. Drummond on the beach at Carnclough, near Glenarm in the county of Antrim, in the month of June 1836, and from its appearance when found it was conjectured that it had been cast ashore by the tide of the preceding night, when a strong easterly wind prevailed. The specimen was given by Dr. Drummond to his friend Mr. W. Thompson of Belfast, and being new in form, was made by the latter gentleman the subject of a communication to the Zoological Society, which appeared in the Proceedings and Transactions of that Society as here quoted.

This specimen, Mr. Thompson observes, "being, so far as known to me, unique, I have been unwilling to injure its appearance by dissection. In external characters it is excluded from the *ophidia* proper in consequence of not having the barbules; and though agreeing with the *Fierasfers* in the negative character of wanting these appendages, yet, by having the dorsal fin strongly developed and elevated, it ranges not with them."

"Its want of the very obvious character of the *Ophidia*, renders all comparison with them unnecessary; but of two species belonging to the *Fierasfers*, and which approach the present specimen most nearly, I may state that it possesses many of the characters of the *Ophidium fierasfer* of Risso, but differs from that species in the teeth, (both jaws are described as armed with three rows of sharp and hooked teeth,) number of fin-rays, and some minor characters; besides, there is nothing said of the remarkable teeth terminating both jaws, as exhibited in my specimen. In the Règne Animal we again find an *Ophidium dentatum* described as having in each jaw "*deux dents en crochets*," but no further details are given. In this only character, however, the *Ophidium dentatum* differs from my fish, which has four large hooked teeth in the upper and two in the under jaw."

"Although when this fish first came into my possession, I saw that it might be classed under the *Malacopterygii Apodes*, and be placed near *Ophidium*, I considered that in a natural arrangement it would best constitute a new genus of the family *Tænioidea* (Riband-shaped). In being apodal it was not excluded from this family, as two genera belonging to it are destitute of ventral fins. I did not hesitate to place it under the *Acanthopterygii*, as some genera which are included in this order are, like it, strictly Malacopterygian, their natural connexion with genera having fins with spinous rays being considered—and in my opinion most philoso-

phically—to outweigh this character; and further, I felt less reluctance in thus placing it, in consequence of *Cepola rubescens*, which it assimilates in some respects, having but one spinous ray, and that in the ventral fin. At the suggestion of John Edward Gray, Esq. F.R.S. I have, however, reconsidered the subject, and have come to the conclusion here advanced."

As a difference of opinion may still exist with regard to the position of this genus, I think it due to Mr. Thompson to subjoin the observations originally made.

"Like certain other genera which are comprehended under *Acanthopterygii*, the first order of the osseous fishes, its fins are altogether destitute of spinous rays; but, like those alluded to, such as *Zoarcus*, &c. its other characters seem to point out the *Tænioides* as the family to which it belongs. Of the eight genera of *Tænioides* already known, viz. *Lepidopus*, *Trichurus*, *Gymnetrus*, *Stylephorus*, *Cepola*, *Lophotes*, *Trachypterus*, and *Alepisaurus*, the specimen under consideration agrees with *Trichiurus* and *Stylephorus* in being apodal, or wanting ventral fins, but in this character only is there any generic accordance. Though considerably more elongated, from the head posteriorly it approaches most nearly to *Cepola rubescens* in the form of the body, and in the forward commencement of the anal fin, which, with the dorsal, is prolonged until it joins the caudal; but it is only in the continuity of these fins until this junction is effected that the resemblance holds, as in my specimen, the dorsal rays, the five foremost of which are very short, increase in length posteriorly, and near the caudal fin are about three times as long as the depth of the body beneath them; in the anal fin, which is throughout much deeper than the dorsal, the rays likewise increase posteriorly; and near the caudal are in length four times greater than the depth of the body at the same place. The length of the posterior rays of these

fins causes the dorsal, anal, and caudal, to appear as one; whilst, though they do join in *Cepola rubescens*, the last ray of the dorsal and anal being much shorter than the outer rays of the caudal, may at the same time be said to mark distinctly the termination of each fin. In my specimen the anal fin originates two lines in advance of the dorsal fin."

In the form of the head, and in dentition, it differs so remarkably from all the other genera as to render a comparison with them unnecessary. Its absolute characters must suffice for distinction.

Description.—"Total length eleven inches; greatest depth at one inch four lines from the snout, six lines, thence posteriorly gradually narrowing; greatest breadth of body anteriorly three lines; at the middle of the entire length one line, and thence to the tail becoming gradually more compressed. Head one inch two lines long, or rather more than one-ninth of the entire length; profile sloping forward equally on both sides to the snout, which is truncated, and projects one line beyond the lower jaw; narrow, increasing in breadth very gradually from the snout, its breadth compared to its length as one to three and a half; height half its length, compressed at the sides, and rather flat above from the eyes backward; from the eyes forward a central bony ridge; snout viewed from above somewhat bifid, in consequence of the forward position of the large teeth on each side. A few large punctures extend from the snout below the eye, and are continued just behind it; a series of small ones closely arranged extend from the upper portion of the eye in a curved form posteriorly to near the edge of the preopercle, and thence a double row extends downwards. Nostrils very large, placed just in advance of, and before the centre of, the eye, and in form a somewhat oval transverse aperture. Eye large, occupying the entire half of the depth of the head; its width greater than its height; in the length of the head occupying

the place of one in four and a half; its distance from the snout three lines, or equal to its diameter, consequently two and a half of its diameters are contained between it and the edge of the operculum. Operculum rounded at the base, terminating in a minute point directed backwards, strongly radiated, striæ distant; preoperculum ascending vertically; cheeks smooth and soft. Mouth rather obliquely cleft. Teeth, two large strong ones, placed close together, and curving inwards at each side the extremity of the upper jaw, the two inner one-sixteenth of an inch apart. In the lower jaw one slender rounded tooth, nearly one line long on each side, curving outwards at the base, and inwards at the point. Entire upper and under jaw and vomer densely studded with small bluntish teeth, somewhat uniform in size; vomer extending far forward, and very much developed, forming a cavity in the lower jaw, and in advance of the tongue when the mouth is closed; a series of rows of teeth similar to those last described on the palatal bones: all the teeth of the upper jaw exposed to view when the mouth is closed. Tongue short, not reaching within two lines and a half of the extremity of the lower jaw, and apparently toothless. On the dorsal ridge, one inch from the snout, or two lines and a half behind the cranium, is a short, stout, bony spine, not very conspicuous, and, excepting at its extreme point, covered with skin: it is six lines in advance of the first ray of the dorsal fin. Scales none, but it may have been divested of them during its short exposure on the beach. Lateral line inconspicuous, being a slight depression extending in a straight line along the middle of the sides posteriorly, or throughout the greater portion of its length, but anteriorly nearer to the dorsal than the ventral profile. Vent one inch three lines from the extremity of the lower jaw. Branchiostegous membrane opens forward rather before the extremity of the gape. Dorsal fin commencing one inch six lines from the snout, low

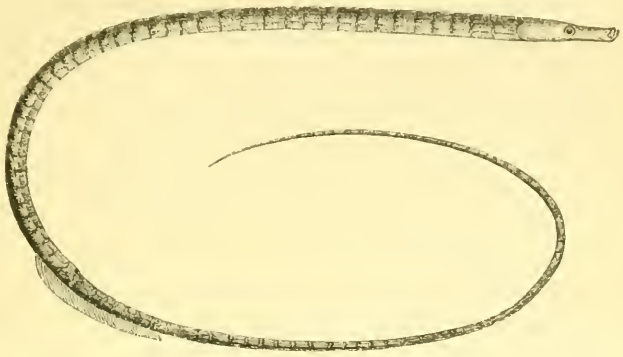
at its origin, but gradually increasing in height to near the caudal fin, which it joins, the two or three anterior rays, which are very short, flexible and simple, the remainder articulated. Anal fin originates just behind the vent, or at one inch three lines from the point of the lower jaw, joins the caudal fin, near to which it increases in depth posteriorly from its origin, deeper than the dorsal fin throughout; at about one inch and a half from the caudal fin the rays are in length four times greater than the depth of the body at the same place, the rays of the dorsal fin opposite being three times the depth of the body; the first and second anterior rays flexible and simple, the remainder articulated. Pectoral fins originate one line behind the head, and are equal to half its length, central rays longest, all very flexible, placed below the middle of the sides. Caudal fin, central rays longest. Articulations very long on the rays of all the fins; no branched rays in any one of them.

B. 7 : D. 180 : P. 16 : A. 180 : C. 12.

The number of the fin-rays were reckoned with the greatest care; but without injury to the specimen they could not be ascertained with certainty to a single ray. The vertebræ, which distinctly seen through the skin can be reckoned with accuracy, ninety-eight. Colours, anterior half a dull flesh colour, similar to specimens of *Cepola rubescens* preserved in spirits, hence it is presumed to have been originally red; behind this portion reddish-brown markings appear on the body at the base of the dorsal and anal fins, and suddenly increase in number, until from an inch behind the middle, the whole sides are closely marked and spotted over; the entire top and the sides of the head before the hinder line of the eye are similarly spotted; just behind the cranium a few spots also appear; the posterior rays of the dorsal and anal, and the entire caudal fin, blackish. Irides, operculum, and under surface, a short way beyond the vent, bright silver."

"The two large teeth, resembling serpent's fangs, which terminate the upper jaw on each side, have suggested the generic appellation of *Echiodon*; and the specific name of Drummondii is proposed in honour of its discoverer."

The figures below represent a side view of the head, the mouth open to show the form and situation of the teeth, enlarged; and a front view of the anterior terminal teeth, also enlarged. The illustrations here used are derived from Mr. Thompson's paper in the Transactions of the Zoological Society already quoted; and I with pleasure avail myself of the opportunity in this instance afforded me of recording my obligations to Mr. Thompson for his kind and zealous co-operation in zoology, and particularly for the loan of this rare specimen, and many other Irish fishes, for examination.



THE STRAIGHT-NOSED PIPE-FISH.

Syngnathus ophidion, Linnæus Syst. Nat. t. i. p. 417, sp. 5.
,, ,, ,, Faun. Suec. p. 131, sp. 1.

It is only within a few years, I believe, that writers on the Natural History of European Fishes have become aware that in quoting, as was almost invariably the case, the figure of the *Syngnathus ophidion* of Bloch, tab. 91, fig. 3, as the true *ophidion*, they were not referring to, because that figure does not represent, the true *Syngnathus ophidion* of Artedi and Linnæus. The fish, as represented by Bloch, does not exhibit any appearance of a caudal fin, but if the species there figured from be examined, it will be found to possess a rudimentary caudal fin,* and could not therefore be considered as referred to by Linnæus in the short but expressive description, *S. pinnis caudæ ani pectoralibusque nullis, corpore tereti.*

The first good figure of the true *S. ophidion* of Linnæus

* British Fishes, vol. ii. p. 339, vignette.

that became known to me appeared in an octavo volume by M. C. U. Ekström, on the Fishes of Morko, in Sudermannland, a province in Sweden, published at Berlin in 1835, a copy of which came into my possession in the autumn of 1836. In 1838, a figure of the head of this fish appeared with others in M. Wiegmann's Archives of Natural History in illustration of a paper on the Swedish species of the genus *Syngnathus* by M. B. Fr. Fries of Stockholm; and this fish having been obtained on the British coast by others as well as by myself I now insert a figure of it, of the natural size, in the present supplement.

The British *Syngnathi*, as suggested by the Rev. L. Jenyns, consist of six species; two marsupial pipe-fish *S. acus* and *S. Typhle*, having true caudal fins: four ophidial pipe-fish, which may be again divided into two sections, the first of which contains two species, *S. æquoreus* and *S. anguineus*,* having each a rudimentary caudal fin;† the second section, also containing two species, *S. ophidion* and *S. lumbriciformis*, in which there is no rudimentary caudal fin, the round tail ending in a fine point.

To this last division belongs the true *S. ophidion* of Artedi and Linnæus, the males of which in the season of reproduction carry the eggs, after deposition by the female, in three or four rows of hemispheric depressions on the under surface of their bodies. This species, which lives among the sea-weed on our coast, is more rare than some others. It was found in Cornwall long ago by our countryman and naturalist John Ray, has been recently described by Mr. Jenyns in his "Manual of British Vertebrate Animals," from specimens obtained at Weymouth, and I also possess several specimens obtained on the Dorsetshire coast.

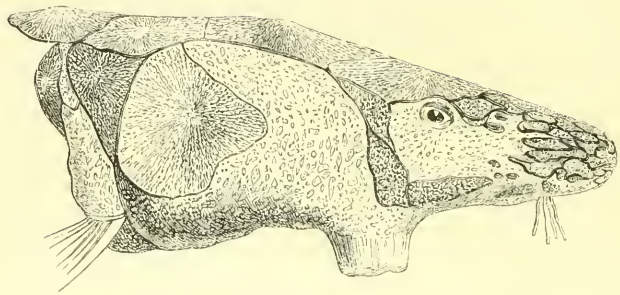
* A specific name proposed by Mr. Jenyns for that species which we had previously called, in error, *S. ophidion*.

† See British Fishes, vol. ii. pp. 337 and 339, vignettes.

This little pipe-fish is long, slender, and nearly cylindrical, but slightly compressed from the head to the anal aperture; from thence to the end of the tail round and tapering very gradually to a fine point; the head is short, the length of it only half an inch in a specimen of nine inches; the length of the head therefore, as compared to the whole length of the fish, is as one to eighteen; the nose is straight, rather compressed, a section forming a hexagon slightly elongated, of which the upper and under angles are the most produced; the distance from the point of the nose to the eye, and from thence to the hinder edge of the operculum, equal; no pectoral, anal, or caudal fin; the anal aperture is near the middle of the whole length of the fish, with a delicately-formed dorsal fin in a line over it, nearly one inch in length at its base, with about one-third of the fin, which contains from thirty-five to forty very slender rays, in advance of the vertical line of the anal aperture. Between the head and the anal orifice there are on the body of the fish about thirty sculptured plates or segments, and nearly sixty on the tail, diminishing gradually in size as they approach the tip.

Colour.—Some specimens are uniform olive green, others are tinged with yellowish brown, and both are occasionally varied with darker shades of colour on the body.

The largest specimens seldom exceed nine inches in length. The figure at the head of this subject is the exact size of the specimen from which it was drawn.



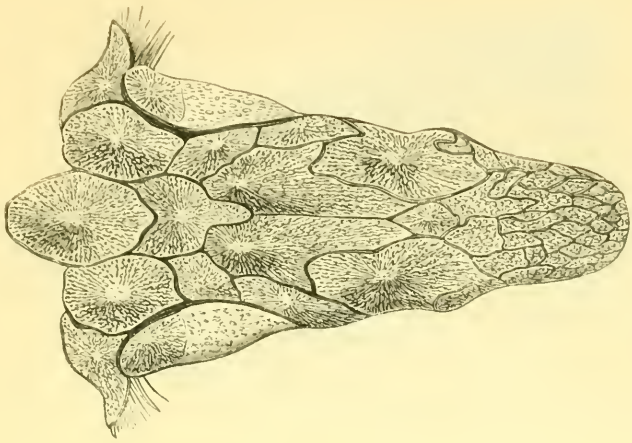
THE BROAD-NOSED STURGEON.

Acipenser latirostris, Broad-nosed Sturgeon, Parnell, Trans. R. S. E. vol. xiv. pl. 4.
,, ,, ,, ,, ,, Fish. of the Forth, Wern. Mem. vol. vii. p. 405, pl. 39.

In the papers here referred to, Dr. Parnell observes, that but one species of Sturgeon has hitherto been recorded by the different writers on British Ichthyology, but from the observations of practical fishermen, as well as his own, Dr. Parnell adds, I think there is little doubt that two species, at least, will in future be recognised as inhabiting the British coast.

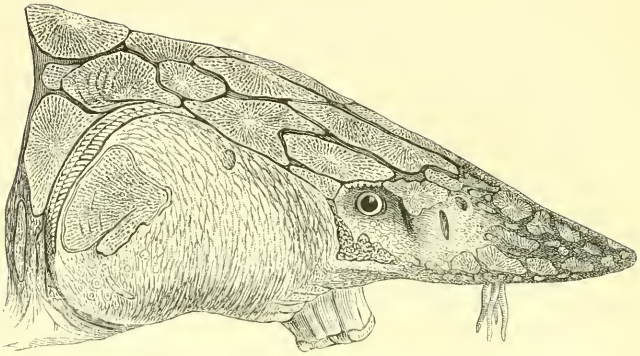
"It has long been noticed by the fishermen of the Solway Frith, that two species of Sturgeon are occasionally entangled in their Salmon-nets, the one with a blunt nose, and the other with a sharp one; the latter species being the most common of the two.

"A fine specimen of the Blunt-nosed Sturgeon was taken in the Frith of Forth in the month of July 1835, and



brought to the Edinburgh market for sale, the head of which I preserved. A few weeks after, another was taken in the Tay, which differed in no respect from the former, except in sexual distinction."

"Length seven feet nine inches; weight eight stone, or one hundred and twelve pounds. The colour of the back and sides is of a light grey, with a shade of olive; the belly dirty white. The body is armed with five rows of osseous shields, running from the head to the tail. The first row commences behind the head, and runs down the central ridge of the back; the two next rows arise one on each side of the former. Immediately on the lower margin of the pectorals the other two rows commence. The skin is rough, with a number of small angular osseous plates intermixed with very minute spicula. The first free shield on the dorsal ridge is nearly circular, and very slightly carinated; all the rest in that row are of an oval form. The snout is wide and depressed, much broader than the diameter of the mouth. On the under surface, placed nearer to the tip of the snout



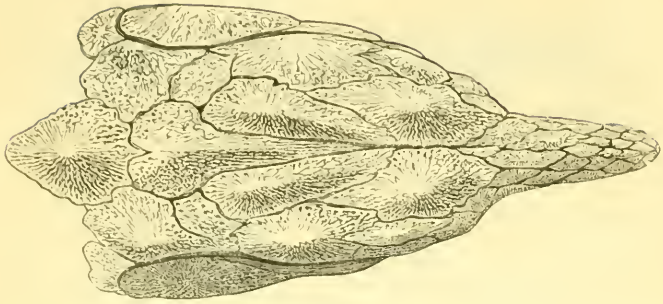
than to the mouth, are four cirri arranged in an irregular line. The summit of the head is rough, with the central plates beautifully radiated, and of a fibrous appearance. The position of the fins is the same as in other Sturgeons."

"This fish differs from the Common Sturgeon, *Acipenser sturio*, in having the tip of the snout much broader than the mouth, in the keel of the dorsal plates being but slightly elevated, and having the cirri placed nearer to the tip of the snout than to the mouth."

"The Sturgeons are all much allied to each other; and not being able as yet to find the right synonym for the present one, I have proposed, in the mean time, the name *latirostris*, as characteristic of the species."

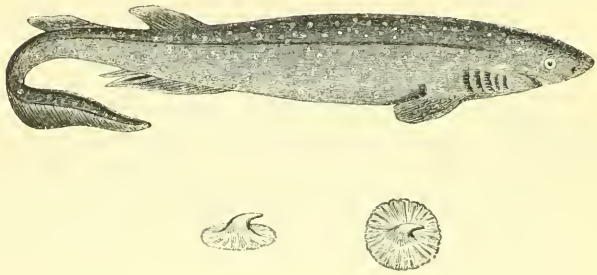
"In the stomach of the one from the Tay was found an entire specimen of the Sea-mouse, *Aphrodita aculeata*."

Dr. Parnell has presented the preserved head of this specimen to the Museum of the Zoological Society; but, like Dr. Parnell, I have been unable to identify it with any described Sturgeon. It does not agree with either of the nine



species found in the various waters of the Russian empire, figured and briefly described by M. A. Lovetski, in the third volume of the Transactions of the Imperial Society of Naturalists at Moscow; nor am I able to say that it agrees with either of the eleven species figured and described by Messrs. Brandt and Ratzburg in their Medical Zoology.

Baron Cuvier has observed in his *Regne Animal*, t. ii. p. 379, note, that the species of this genus are not yet well determined by naturalists, nor their comparative characters sufficiently defined. Supposing that the bony plates of the head by their form, size, and relative situation might afford specific characters, I have given two views of these parts in our two British Sturgeons, not without some suspicion, like Dr. Parnell, that we may have even more than two.



THE SPINOUS SHARK.

Echinorhinus spinosus,	Blainville, Faun. Franç. Poiss. p. 66, sp. 6.
,, ,,	Musignano, Faun. Ital. pt. xiii.
,, *obesus*,	Dr. A. Smith, Zool. South. Afr. No. 1.
Squalis spinosus,	Gmelin, Syst. Nat. I. p. 1500, sp. 27.
,, ,,	Lacepede, Hist. Nat. Poiss. 4to. t. i. p. 30, tab. 3, fig. 2, 8vo. t. 5, p. 354, pl. 22.
,, ,,	Schneider, p. 136, sp. 31.
,, ,,	Risso, Ichth. p. 42, sp. 18.
Scymnus ,,	,, Hist. t. iii. p. 136, sp. 21.
,, ,,	Cuvier, Règne An. t. ii. 1829, p. 393.
Gonoidus ,,	Agassiz, Recherches sur les Poiss. Foss.

Generic Characters. Echinorhinus, Blainville. *Gonoidus*, Agassiz.—The first dorsal fin opposite to the abdominal ones. Teeth in both jaws, broad and low, the edge nearly horizontal; the lateral edges have one or two transverse denticles. (1 species.)*

Soon after the publication of that part of the British Fishes which contained the Sharks, I received a communication from Mr. John Hey, then Honorary Curator to the Leeds Philosophical Society, with a coloured drawing of the well known Spinous Shark of authors, a specimen of which

* Müller and Henle. Generic characters of Cartilaginous Fishes. Mag. Nat. Hist. for 1838, p. 89.

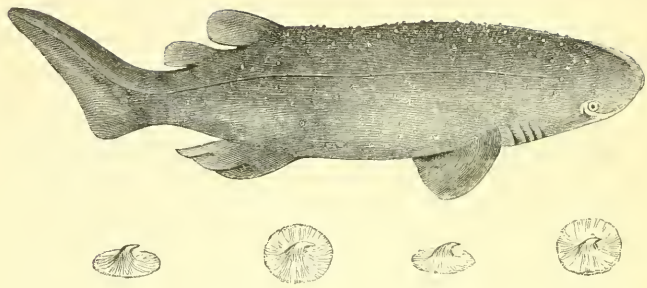
had been taken in Filey Bay, on the Yorkshire coast, in the summer of 1830, and therefore entitled to a place among British Fishes; but the whole of the then remaining portion of the work being at that time printed for publication on the 1st of August, 1836, I was unable to avail myself of this interesting information, which came to my hands on the 7th of July.

On the 30th of the same month I was favoured with a letter from Dr. H. S. Boase, of Penzance, containing an account of the capture of a Spinous Shark on the 23rd of that month, near the Land's End; and Dr. Boase also very kindly sent me in his letter pen-and-ink sketches of two views of this Shark, made to a scale of one inch to a foot, with representations and specimens of the teeth and spines.

In November 1837, the Rev. Robert Holdsworth sent me notice by letter of the capture of a Spinous Shark, taken in a trawl-net off Brixham, with pen-and-ink sketches of the form of the body, with a small portion of its spine-studded skin, and some of its teeth.

At the meeting of the British Association at Newcastle-upon-Tyne, in August 1838, Arthur Strickland, Esq. of Bridlington, exhibited in the section devoted to Natural History a drawing, and read a short description, of a Spinous Shark, which had been recently found on the Yorkshire coast, and was evidently of this species, Mr. Gray referring to the figure of it lately published by Dr. Andrew Smith in the first number of his "Illustrations of the Zoology of South Africa," which the drawing exhibited by Mr. Strickland very closely resembled.

Lastly, I may add that on the 9th of November 1838, the Rev. Robert Holdsworth sent me word that another specimen of the Spinous Shark had been caught on a fisherman's line off Berry Head on the previous Tuesday. I soon afterwards received a notice of this last capture from my



friend Mr. Couch, of Polperro, and also from Mr. Heggerty, of Torquay, to which place, as I understood, this last specimen had been brought for preservation.

Four examples of this Shark are therefore known to have been obtained on our coasts within the last three years, and one in the summer of 1830.

This very remarkable Shark was first described by Broussonnet under the name of *Le chien de mer bouclé*, in the "Memoires de l'Académie des Sciences pour 1780," and, as may be seen by the numerous synonymes at the head of this subject, is a species that is exceedingly well known, having a wide geographical range, extending from the North Sea to the Cape of Good Hope in one direction, and from the Shores of Italy into the Atlantic in another.

The specimen described by Broussonnet measured only about four feet in length; but it has been taken upwards of seven feet long on the Cornish coast; and M. Risso mentions that one of four hundred pounds' weight, and therefore probably still longer than the Cornish specimen, was caught by the Mandrague, or Tonnaro fishermen of Nice, in the horizontal nets set up by them to catch Tunnies.

Some differences will be observed in the comparative length and thickness of the figures here given, the first of

which is taken from the drawing sent me by Mr. John Hey of the Filey Bay specimen; the second representing, on the other side, a more bulky fish, is taken from Dr. A. Smith's illustrations. The figures given by Lacépède and the Prince of Musignano are rather long and slender, and were probably taken from specimens of small comparative size; the figure sent me by Dr. Boase from a fish more than seven feet long, and the drawing exhibited by Mr. Strickland at Newcastle, more resembled the figure by Dr. Smith. Some specimens are described as being intermediate, and all these differences in the same species may be referred to age or sex, or both, a young male and an old female presenting the greatest contrast. The decided similarity in the teeth, which are very peculiar, and which only differ in size, with the particular character of the skin and its spines, with their radiated bases, leave no room to doubt that these various examples belong to one and the same species.

We become a little acquainted with some of the habits of this Shark by noticing the circumstances under which it has been captured. Of the first Cornish specimen, Dr. Boase says, this Shark was caught on the 23rd of July, 1836, west of the Long Slips, Land's End. Just before the moon set the fishermen had been very successful, but all at once lost their sport, or as they expressed it, "the Congers suddenly sheered off to a man." When hooked, it was not more troublesome than a Conger; but when brought to the water's edge, it gave battle, and was secured with great difficulty. The first specimen noticed by the Rev. Robert Holdsworth as caught in a trawl-net off Brixham, had a portion of a Gurnard in its stomach. Of the third specimen, caught on the southern coast, near Berry Head, Mr. Holdsworth says, this Shark was taken near the bottom on a hook baited with cuttle. The men were fishing for Conger Eel, and other large fish, when this Shark was hooked. They describe his

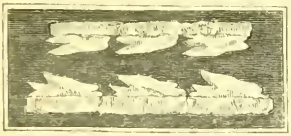
action in the water as most powerful, and were obliged to let him run with the line four times to the bottom before they could hamper him with a sliding noose let down over the line to his tail. These lines and the trawl-net only do their work at the bottom, and we may, therefore, conclude that this species is a Ground Shark. As such Cuvier had arranged it in his genus *Scymnus*, and Dr. Andrew Smith, who from his extensive acquaintance with this division of the cartilaginous fishes is an admitted authority, confirms this opinion. Of this Spinous Shark, Dr. Smith says, "This species is comparatively rare at the Cape of Good Hope. It is described by the fishermen as sluggish and unwieldy in its movements, and but seldom to be observed towards the surface of the water. When they obtain specimens, it is generally at a time when they are fishing in deep water, and when the bait with which the hooks are armed is near to the bottom. In this respect it resembles the *Scyllia*, or Ground Sharks; and, if we were to regard only its internal organisation, we should be disposed to consider it as closely allied to that genus."

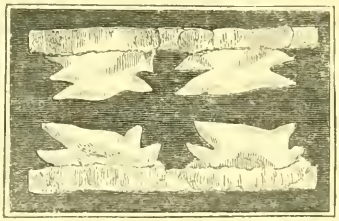
Never having seen a specimen of this Shark, the following description of its colour and form is derived from Dr. Smith's work.

Colour:—The head and back, as far as the first dorsal fin, dark leaden grey; the rest of the back, the sides, and the belly, pale coppery yellow, clouded with purple and brownish tints; and the belly besides is marked with blotches of light vermilion red; the fins towards their bases reddish brown, tinged with dull grey, towards their extremities a lighter shade of the same colour; chin, sides of muzzle, and sometimes a spot behind the eye, dull white; eyes coppery green.

Form, &c.—Body very thick in proportion to its length, with only a slight diminution in size towards the tail; the back in front of the first dorsal fin nearly straight; the head

flat above, and slightly sloping to the muzzle, which is rounded; nostrils transverse, and each partially divided by a narrow membranous lobule, which projects backwards from its anterior margin; their position is nearly over the most projecting, or central portion of the upper jaw, considerably nearer to the eyes than the tip of the snout, and about half way between the latter, and the angle of the mouth. Eyes rather nearer to a line raised from the angle of the mouth than to the nostrils; pupil circular and small; postocular spiracle scarcely visible. Gape wide and arched, having at each corner a triangular fold of skin formed by the union of the upper and lower lips. Teeth regularly placed upon each jaw, only one row in use at a time, the rest reclined; they are large, compressed, and somewhat quadrangular, the cutting edges nearly horizontal, and both of their sides are generally bicuspidate, as will be seen by the figures here inserted, representing from both specimens the teeth of both jaws as opposed to each other.

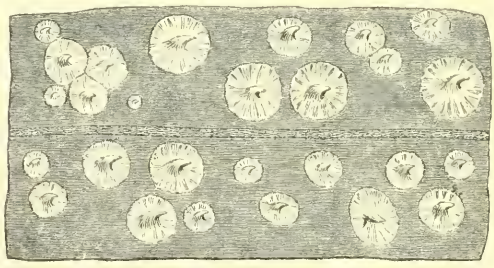




Branchial openings all in front of pectoral fins; the first not more than half the length of the fifth. Pectoral fins rather small, the hinder edges nearly square; the dorsal fins are small, the first narrower at its base than at its extremity, which is slightly rounded; the second nearly throughout of equal breadth, the hinder edge almost square; the ventral fins short, broader behind than at their bases, and their posterior edges slightly undulated; the caudal fin entire, some-

what triangular, and slightly falciform; the upper portion high above the line of the back, the lower scarcely below the line of the body immediately in front of it. Lateral line distinct, commencing above the branchial openings, and extending nearly without curve or undulation to the commencement of the caudal fin, from thence it ascends the latter, and extends along it, nearer to its anterior than posterior edge, until it reaches its upper extremity; at its origin this line is nearer to the middle of the back than the base of the pectoral fin; to the touch it feels slightly rough, which arises from its being beset with a number of minute prickles, which are most distinctly seen in preserved specimens. The surface of the skin both on the body and fins is more or less sprinkled with strong bony-looking spines, with large circular and flattened bases, which are striated from the centre towards the circumference. These spines vary in size as well as form, some being hooked, others quite straight; in some places they are disposed in clusters, in others they are solitary, and on the extremity of the muzzle are nearly wanting. The appendages to the ventral fins in the male seldom extend much beyond their posterior margins."

According to M. Risso, the females of this species have a smaller number of these spines than the males.



THE HAMMER-HEADED SHARK.

Zygæna malleus. Val.

Zygæna,	Belon, p. 61.
,,	Rondelet, 1554, p. 389.
Marteau,	,, 1558, p. 304.
Zygæna,	Salvianus, tab. 40.
,, *Salviani,*	Willoughby, p. 55, B. 1.
Squalus zygæna,	Linn. Syst. Nat. t. i. p. 399, sp. 5.
,, ,,	Duhamel, sect. IX. pl. XXI. fig. 3.
Squale marteau,	Lacepede, t. i. p. 257, 4to. edit.
,, ,,	,, t. v. p. 443, 8vo. edit.
,, ,,	Risso, Icht. p. 34.
Zygæna malleus,	,, Hist. p. 125.
,, ,,	Val. Mem. du Mus. t. ix. p. 222.

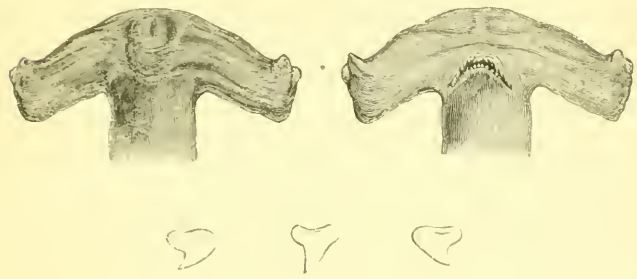
Generic Characters.—Head depressed, more or less truncated in front, the sides extended horizontally to a considerable length, with the eyes at the external lateral extremity. Teeth of the same shape in the upper and lower jaw, viz. the points directed towards the corner of the mouth, with a smooth edge when young, but distinctly serrated in adult specimens. Branchial openings five. Two dorsal fins, the first in a line close behind the pectorals; the second over the anal fin.

In the sketch of the Natural History of Yarmouth and its Vicinity, by C. J. and James Paget, which I have frequently had the pleasure to refer to in the History of the British Birds, and also in the British Fishes, it is stated at page 17 that a specimen of the *Squalus zygæna*, or Hammer-headed Shark, was taken there in October 1829, and deposited in the Norwich Museum; and by the kindness and influence of J. H. Gurney, Esq. of Norwich, I have had the loan of drawings that were made from this Shark sent to London for my use in this work.

Among the numerous species included in the genus *Squalus* of Linnæus, — and I might say, indeed, in the whole class of Fishes,—there is no form more extraordinary than that of the Hammer-headed Sharks, four species of which are noticed in the memoir by M. Valenciennes here quoted, where they are considered as a sub-genus, under the name of *Zygæna*.

The Hammer-headed Shark taken on the coast of Norfolk, being also a native of the Mediterranean Sea, has been long known, and is figured in the works of Belon, Rondelet, and Salvianus, as already quoted. Its greatest singularity consists in the extraordinary form of the head; but its habits, as far as they are known, afford no physiological illustration of this very remarkable structure. In other respects it is very like the Sharks in general. This species is said to be ferocious, to frequent deep water, and measures from seven to eight feet in length. Baron Cuvier states that it has been known to attain the length of twelve feet. The female produces ten or twelve young ones in spring, which acquire considerable size by the end of autumn. In some countries the flesh of several species of Sharks is eaten, but that of the Hammer-headed Shark is said to be not only hard, but very unpleasant both in smell and flavour.

The head of this Shark, — representations of the upper and under surface of which, on a small scale, are given below, — measured from one eye to the other, is very large and wide; the eyes are furnished with eye-lids, which arise from the internal part of the orbits, the irides are golden yellow, the pupils black; the nostrils are elongated, and open immediately underneath the depression, or notch, in the anterior margin of the laterally expanded portions of the head; the mouth semicircular, and furnished with three, four, or five rows of teeth, depending upon the age of the specimen; these teeth are large, sharp, somewhat triangular and curved, with smooth cutting edges when the Shark is young, but serrated afterwards; the teeth in the upper jaw having their points directed towards the angle of the mouth; those of the lower jaw have the same direction, but they are narrower.



The body is elongated, covered with a skin slightly granulated; the colour greyish brown above, nearly white beneath: branchial openings five, all before the base of the

pectoral fin; the pectoral fins nearly triangular; the first dorsal fin large; the second small, and placed just in advance of the commencement of the tail; the inferior lobe of the tail small, the superior portion as long as the head of the fish is wide; the anal fin is under the second dorsal.

This species is found in the Mediterranean, on the shores of the various countries of Europe, in the Ocean, and on the coast of Brazil.

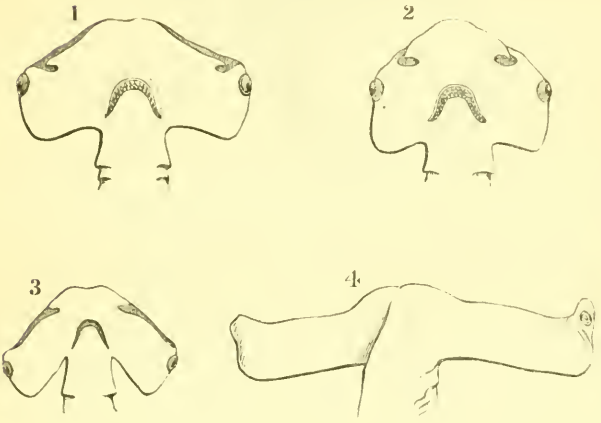
To make this subject as complete as my means will allow, and afford an opportunity of identifying any other species of *Zygæna* that might wander to our shores, I here add, as a vignette, representations of the heads of the other known species, of which No. 1 is *Zygæna tudes*, Val. the synonymes being, according to M. Valenciennes, *Le Squale pantouflier* of Lacépède, t. i. p. 260, pl. VII. fig. 3. Duhamel, sect. IX. pt. ii. pl. XXI. fig. 4 to 7. Koma Sora Russel, pl. XII. This species has been found in the Mediterranean, on the coast of Coromandel, and at Cayenne, S. America.

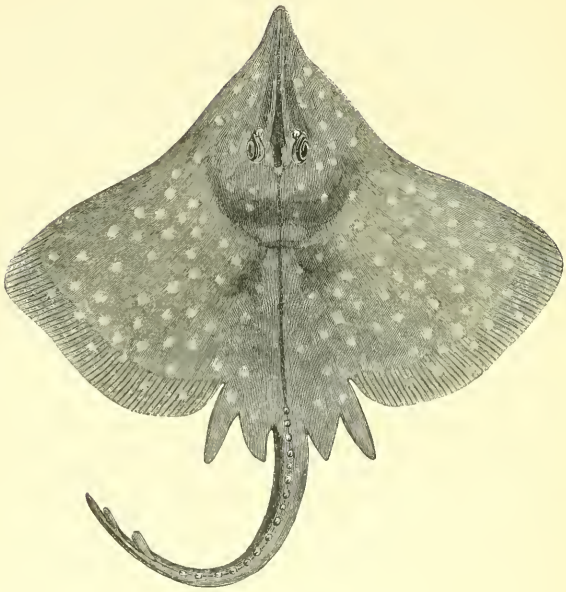
No. 2. *Zygæna Tiburo*, Val. syn. *Squalus Tiburo*, Linn. tom. i. p. 399, sp. 6. *Tiburonis species minor*, Mareg. 181. Willoughby, tab. B. 9, fig. 3. Klein Misc. Pisc. III. p. 13, tab. II. figs. 3, 4. This species has only as yet been met with on the coast of Brazil.

No. 3. *Zygæna Blochii*, Cuv. *Règne An.* t. ii. Bloch, pl. 117. The locality from which this species was obtained is unknown, but specimens are still preserved.

No. 4. *Zygæna laticeps*, Cantor. This is a new species lately described and figured by Dr. Theodore Cantor, who obtained it in the Bay of Bengal, and in which the head is still wider than in either of the other known species; a straight line drawn from the one eye to the other is equal to about one half of the total length of the fish.

In shape the fins are like those of the four species already known; the only difference I have observed, says Dr. Cantor, is the situation of the anal fin, which in the present species is somewhat anterior to the second dorsal, while these fins in the others are opposite.





THE FLAPPER SKATE.

Raia intermedia. Parnell.

Raia intermedia, Flapper Skate, Parnell, R. S. E. Proceedings, 17 April, 1837, p. 166.
,, ,, ,, ,, ,, Trans. R. S. E. vol. xiv. pl. 6.
,, ,, ,, ,, ,, Mem. Wern. Nat. Hist. Soc. vol. vii. p. 429, pl. XL.

"This fish," says Dr. Parnell, "which was obtained in the Frith of Forth in the month of May, seems to be a new species of Skate, since I am not aware of its having been previously described. It appears to be the connecting link between *Raia batis* and *Raia oxyrhynchus*, to both of which it is closely allied, and it is from this circumstance that I suggest the specific name of *intermedia*."

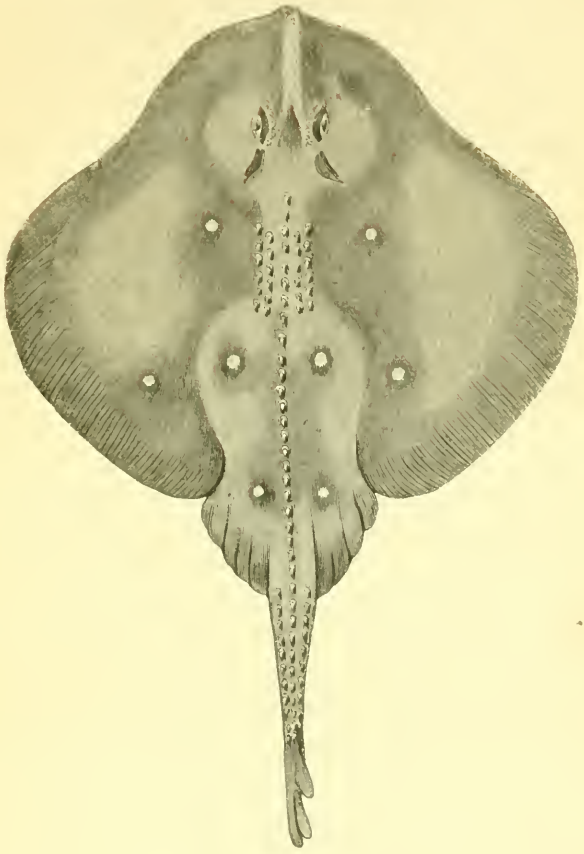
"It is distinguished from *Raia batis*, in the upper surface of the body being perfectly smooth, without granulations, and of a dark olive colour spotted with white; in the anterior part of each orbit being furnished with a strong spine pointing backwards; in the dorsal fins being more remote from each other, and in the anterior margins of the pectorals being rather more concave, giving the snout a sharper appearance; whereas, in *Raia batis*, the upper surface of the body is rough to the touch, of a uniform dusky grey without spots; the orbits without spines; the dorsal fins nearly approximate, and the anterior margins of the pectorals nearly straight."

"It is likewise removed from *Raia oxyrhynchus*, in the snout being conic; the under surface of the body dark grey; a spine in front of each orbit, and the back of a dark olive-green, spotted with white; whereas in the *Raia oxyrhynchus*, the snout is sharp and long, with the lateral margins parallel near the tip; the under surface of the body pure white, and the back of a plain brown without spots."

This species is not uncommon in the Frith of Forth, and I have met, observes Dr. Parnell, "with two examples of a variety of this fish which were taken in the salmon-nets at Queensferry. They were both of small size, about eighteen inches in length. The back was of a uniform dark olive green without spots of any description, covered with a thick mucus; under surface of a dark grey; body very thin; snout sharp, conical; pectorals at their anterior margin rather sinuous, passing off somewhat suddenly at that part, in a line with the temporal orifices, giving the outline of the anterior part quite a different appearance to that observed in *Raia intermedia;* the anterior part of each orbit is furnished with a spine; back perfectly smooth; tail with one row of spines on the dorsal ridge; fins, and in all other respects, similar to *Raia intermedia*."

A female specimen of this fish, about two feet in length,

tail included, is thus described by Dr. Parnell:—"Body rhomboidal, the transverse diameter equalling the distance between the point of the snout and the last tubercle but three on the central ridge of the tail; from the point of the snout to the temporal orifice, rather more than one third the length as far as the end of the anal fin, and one fourth the length as far as the termination of the first dorsal. Body very thin; snout pointed, conical; pectorals large, somewhat of a triangular form, uniting in front at the snout, and terminating at the base of the ventrals; the anterior margin rather concave, the posterior margin rounded; ventrals about three times the length of their breadth; anals commencing close behind the ventrals, and terminating in a free point; rounded at the outer margins. Tail short and firm, being no longer than the distance from the base of the anal fin to the anterior margin of the orbit; along the mesial line is a line of tubercles with sharp points directed downwards, about eighteen in number, commencing at the base of the anal, and terminating at the commencement of the first dorsal fin; no lateral spines visible. First dorsal fin small, rounded at the free extremity; situated about one third of the length of the tail from the tip: the base of the fin about equalling the length: second dorsal rather smaller than the first, and about the same form, placed about half-way between the termination of the first and the tip of the tail; caudal fin rudimentary. Colour of the upper surface of the body of a dark olive green, with numerous white spots; on the under surface dark grey, with minute specks of a deeper colour. Eyes rather small, flattened above, placed in front of the temporal orifices; skin both above and below perfectly smooth; a strong, sharp, bent spine in front of each orbit; no spine or tubercles of any description on the back. Mouth large, placed beneath; teeth small, not so large or so sharp as those in *Raia batis*.



THE SANDY RAY.

Raia radula,	Delar. Mém. Poiss. Ivic. in An. Must. Hist. Nat. t. xiii. p. 321.	
,, ,,	*Raie râpe,*	Risso, Hist. t. iii. p. 151, sp. 38.
,, ,,	,, *ratissoire,*	Blainv. Faun. Franc. p. 25.
,, ,,	*Razza scuffina,*	C. L. Bonap. Faun. Ital. pt. xiii.
	The Sandy Ray, Couch, Mag. Nat. Hist. vol. xi. p. 71.	

In the second volume of the New Series of the Magazine of Natural History, and the eleventh volume of the whole

work, Mr. Couch has given a figure and description of a species of Ray, which he hopes will be sufficient to prove that it cannot be confounded with any other Ray recognised as British; "but whether," says Mr. Couch, "it can be referred to any species described by other authors, I am not able to specify, except that I have with some degree of hesitation, supposed it to be possibly the *Raia asterias* of Ray, Syn. Pisc. p. 27."

"I cannot, however, persuade myself but that this species has been described by some authors, to whose writings I have no opportunity of obtaining access; I therefore refrain from assigning to it a trivial name, that I may be in no danger of adding to science a useless synonyme. Its English name of Sandy Ray, will be sufficient as a provisional designation."

The close accordance of the figure and description of this fish given by Mr. Couch, to the figure and descriptions of the *Raia radula* of the authors here quoted, leaves little room to doubt but that they refer to the same species, and I include the fish, therefore, as here given, on Mr. Couch's authority.

"It bears but a distant resemblance to the *Raia maculata*, or Homelyn," Mr. Couch observes, "either in appearance or value; for while the Homelyn is esteemed as food, either fresh or salted, this is thought worthy only to bait the crab-pot, or, just as frequently, to be thrown aside for manure. It is of frequent occurrence in moderately deep water, from spring to the end of autumn. In winter, however, it is not often seen, chiefly, perhaps, because at that season the boats do not venture quite so far from land; but, perhaps, also, from the fish having changed its quarters. It seems to be an indiscriminate feeder, living on small fishes, and different kinds of crustacea."

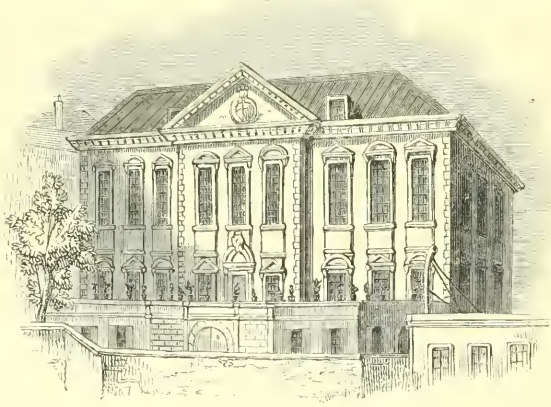
"The specimen described, which was of the ordinary size,

measured three feet eight inches in length, of which the tail was nineteen inches; the breadth two feet four inches and a half. The snout projected three-quarters of an inch, prominent and elevated; the mouth three inches and a half wide, six inches from the snout. Under jaw peaked in the middle; the teeth slender, sharp, in rows not very closely placed. The body passes off circularly from the snout, the greatest breadth opposite the centre of the disk, and of a rounded form. From the snout the ridge is elevated to the eyes, a distance of five inches and three-quarters; eyes two inches asunder; temporal orifices large. Body thickest posteriorly; the tail stout at its origin, rounded above, tapering; a groove along the body and tail; two fins on the latter close together. A few spines near the end of the snout; a semicircle of them behind each eye; four short parallel rows on the centre of the back, and a middle one continued along the groove to the tail, which is covered with stout hooks, scarcely in regular order. The remainder of the body smooth. Colour above a uniform dusky brown, white below. On the back a variable number of ocellated spots, the size of the section of a large pea; the centre pale yellow, the margin a deeper impression, of the colour of the skin. I have counted from eight to sixteen of these spots in different specimens, and believe they have no determinate number; but they are always placed, on each side, with corresponding regularity."

"Besides this description and figure, which I hope will enable those who visit our fishing vessels to ascertain this species, I will further observe, as marks of distinction from the other British species of this genus, that in addition to the form of the teeth, which are crooked and slender, resembling a bird's claw in miniature, but which still are less long, slender, sharp, or crooked, than in young specimens of the *Raia oxyrhynchus*, it may be distinguished by a great ten-

deney to circularity in the disk, formed chiefly by a rounding off of the pectoral fins, by a flatness of the anterior portion, by the uniformity of its colour, the regularity of the spots, and the comparatively short and tapering tail."

The vignette below represents the late Hall of the Company of Fishmongers of London. The present new Hall is represented in the British Fishes as the final vignette to Volume II.



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